FOOD ENGINEERING

November 1953

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ELECTRIC EYE "traffic cops" (opposite inspector) pilot pans from two lines into single file in Bond's advanced bakery. (P. 72)

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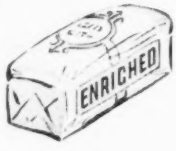

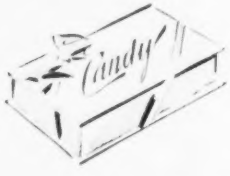

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Food Engineering

Vol. 25 • NOVEMBER, 1953 • No. 11

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FOOD ENGINEERING
(Formerly Food Industries)
November 1953 Vol. 25, No. 11

Member ABC and ABP

Published Monthly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. **Publication Office 99-129 N. Broadway, Albany 1, N. Y.**

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York, 36, N. Y. Donald C. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President & Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Div.; Ralph B. Smith, Vice-President and Editorial Director; Nelson Bond, Vice-President & Director of Advertising; J. E. Blackburn, Jr., Vice-President & Director of Circulation.

Subscriptions: Address correspondence to Food Engineering—Subscription Service, 99-129 N. Broadway, Albany 1, N. Y. or 330 W. 42nd St., New York 36, N. Y. Allow one month for change of address.

Subscriptions are solicited only from the executives, engineers, and technologists in food processing plants. Position and company connection must be indicated on subscription orders.

Single copies 35¢. Subscription rates—U. S. and possessions $2 for 1 yr., $3 for 2 yr., $4 for 3 yr. Canada, $3 for 1 yr., $4 for 2 yr., $5 for 3 yr. Other Western Hemisphere countries $10 for 1 yr., $16 for 2 yr., $20 for 3 yr. All other countries, $15 for 1 yr., $25 for 2 yr., $30 for 3 yr. Entered as 2nd class matter Aug. 26, 1948, at Post Office at Albany, N. Y. under Act of Mar. 3, 1879.
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Here Are Facts You Should Know About Electric Motor Bearings

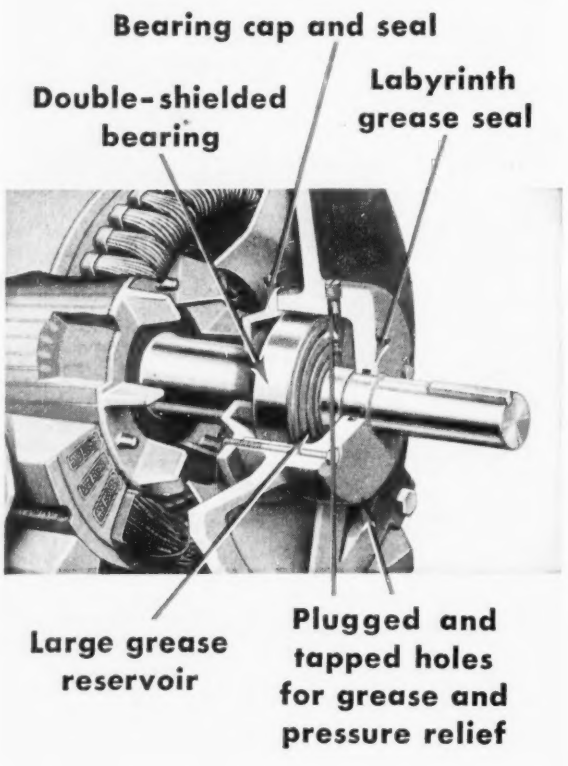
AN ideal motor bearing would operate for indefinitely long periods under all types of conditions without requiring any attention whatever. However, in the opinion of our engineers, such a bearing and its attendant lubricant are not yet available on the commercial market. Consequently, bearings for many types of operations, particularly where overloading, extreme temperature ranges and chemical and dirt laden atmospheres are involved, require special lubricants or regular lubrication schedules.

Of course, bearings suitable for many kinds of operation under normal conditions can be built to require no attention for very long periods — usually several years. Allis-Chalmers can supply sealed bearings in all frame sizes through 505 on short delivery and without extra cost for applications of this type.

Which is the Best Design for *Your* Application?

We believe that the design used in standard Allis-Chalmers drip-proof, tefc and explosion-proof motors represents the best design for most industrial users.

The Allis-Chalmers standard design consists of a pre-lubricated, double-shielded bearing mounted in the end housing with a generous grease reservoir. Plugged and tapped holes are provided for grease and for pressure relief. Under normal operating conditions, this design will operate as long without attention as any other type of bearing in use today. But where difficult operating conditions make re-lubrication desirable, it can be done as part of the normal lubricating routine without dismantling the motor.


Bearing cap and seal
Double-shielded bearing
Labyrinth grease seal
Large grease reservoir
Plugged and tapped holes for grease and pressure relief

The large grease reservoir and shielded bearing design assure that grease lost from the bearing due to high operating temperatures or other causes will be replaced automatically.

For further information on bearing design and other features of Allis-Chalmers motors, call your nearby Allis-Chalmers District Office or Authorized Distributor.

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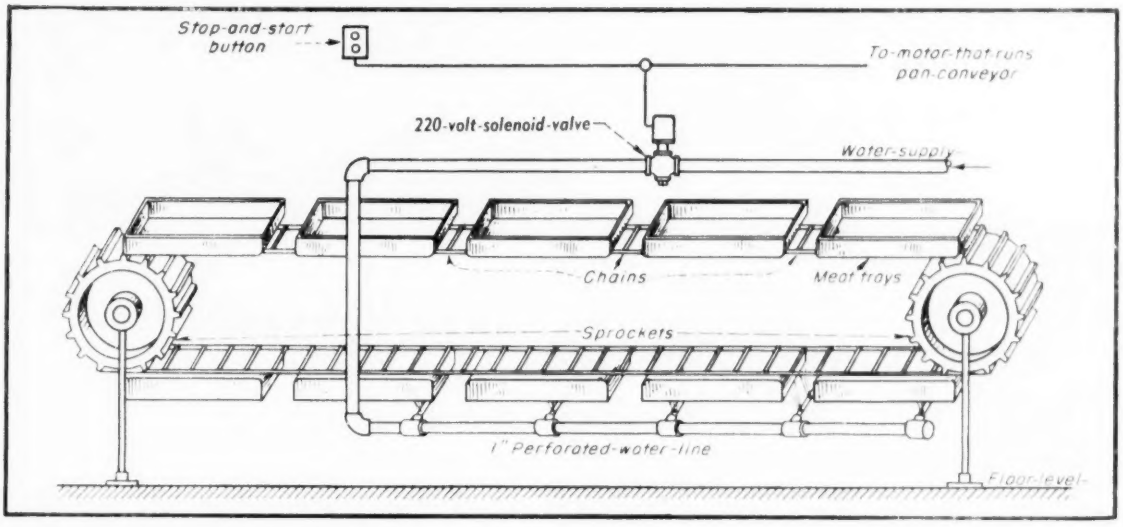
PRACTICAL IDEAS



Wash-Water Losses Prevented

Installation of a relatively inexpensive solenoid valve in one of our wash-water lines has saved many dollars formerly paid for wasted water.

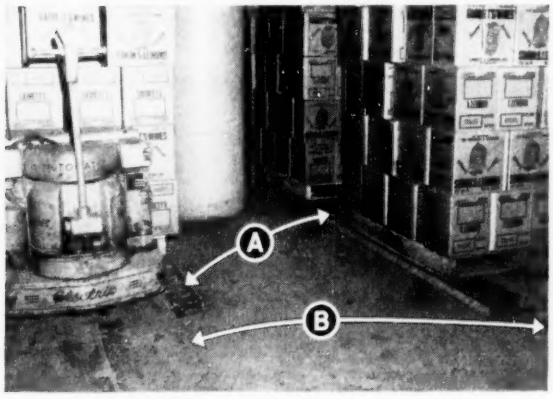
Here's the condition which caused waste of water and the simple means we employed to prevent the loss:

In one operation at our hog killing and dressing plant, cut pieces of meat are placed in trays or pans travelling on a chain conveyor. On the slack return side, upside-down pans are cleaned by water sprays squirting up from perforated cross-member pipes directly beneath them.

During lunch hours, rest periods, or at any time line was stopped, water continued to pour uselessly from the sprays.

Then, we installed a solenoid valve (see sketch) on the water line and wired controls into pan conveyor motor, start-stop circuit.

Solenoid controlled valve opens when conveyor motor is energized, is closed when conveyor motor circuit is interrupted. Thousands of gallons of water formerly wasted are now saved.—*J. R. Furgeson, Chief Engineer, Pepper Packing Co., Denver.*



Ideal Roller Conveyor for Pallets

Maintaining a constant supply of palletized cases of empty wine bottles at unscrambling stations became possible only when we installed a satisfactory roller conveyor system for building up a supply of pallets.

Formerly, to prevent filling-line interruptions, it was necessary that a worker, with truck and loaded pallet stand by to remove empty pallet and replace it with full one.

Now a truck operator quickly supplies all lines with a reserve of 5 to 6 loaded pallets, then turns to other tasks. Loaded pallets are easily rolled to unscrambling station.

First roller conveyor approach was laid on floor full width of pallet. Pallet bottom irregularities and friction made case moving too difficult. Then narrow rollers—(A) in photo—were installed. These proved to have two advantages.

Little effort is needed to advance pallets along narrow rollers. Also, space between them is ample for a steel plate approach (B) which permits truck to carry pallets over rollers before lowering them.—*Robert W. Garrett, Vice President in Charge Production, Garrett & Co., Brooklyn.*

Pumping Sure With Stand-by Turbine

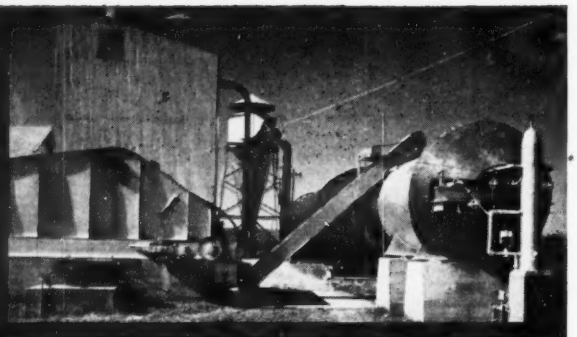
Through use of simple control system a steam turbine can be automatically cut in to continue motor driven pumping operation in event of power failure.

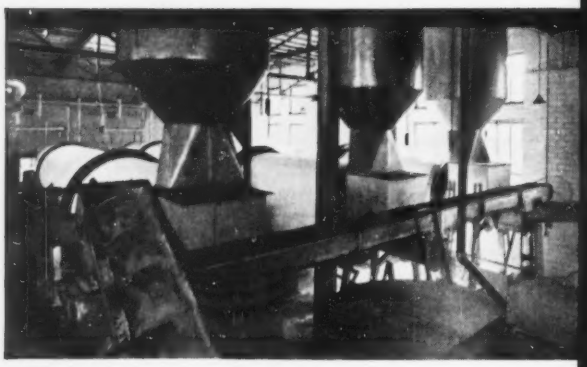
Here's how system is constructed and how controls are installed. Two pumps side by side are connected to the same suction and same discharge lines, with suitable check valves, of course. One of these pumps is steam turbine driven and one is electric motor driven. The turbine-driven pump is a stand-by in case of power failure.

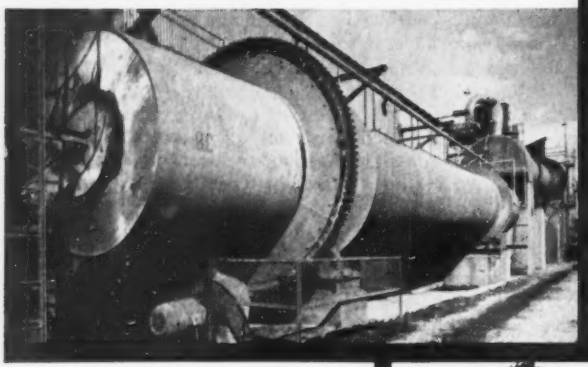
A pressure sensing tap is installed in the discharge line of the electric pump. This tap feeds into a pneumatic type pressure controller that positions a pneumatic diaphragm motor valve in the steam feed line to the turbine-driven stand-by pump. A warning bleeder by-pass is provided around this valve.

This is the operating sequence:

more than 50 years of experience in designing and building dryers for industry...







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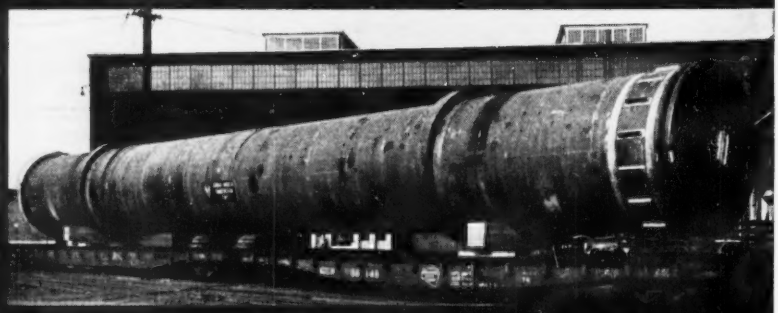

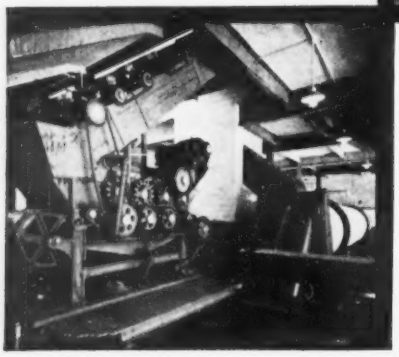

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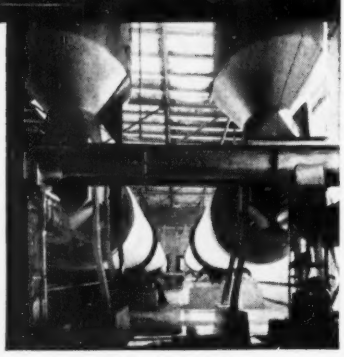
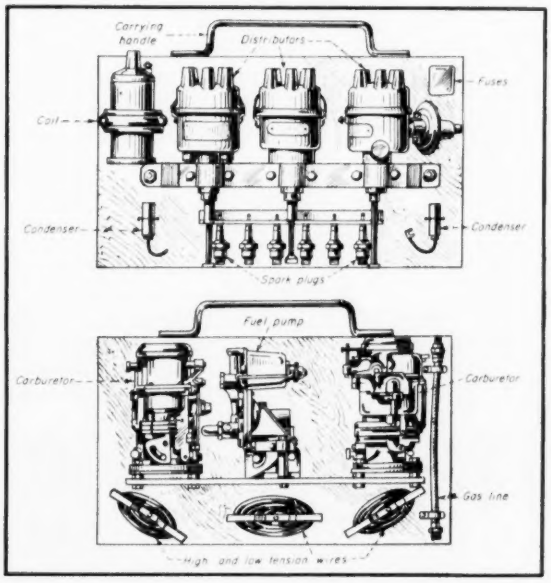


1. Power fails on electric pump.
2. Pressure ahead of check valve falls quickly to suction pressure and pressure controller opens diaphragm valve in steam feed line to turbine-driven pump. This pump immediately takes over pumping job and process is uninterrupted except so briefly it makes no difference.
3. When electric power has been restored, and electric pump has been started manually, pressure controller automatically shuts down turbine-driven pump as pressure is restored at the discharge end of the electric pump.

Since it is connected ahead of the check valve, the pressure controller will not cut in during temporary pressure reduction because it can be set to cut in at only a little higher than suction pressure.

Also, the pressure controller will not limit the pressure of the turbine-driven pump because it is connected on the motor-driven pump side of the line between the motor-driven pump and the check valve. It is therefore not affected by discharge pressure produced by the turbine-driven pump when it is operating.—*Industrial Control News, Minneapolis-Honeywell Regulator Co., Philadelphia.*



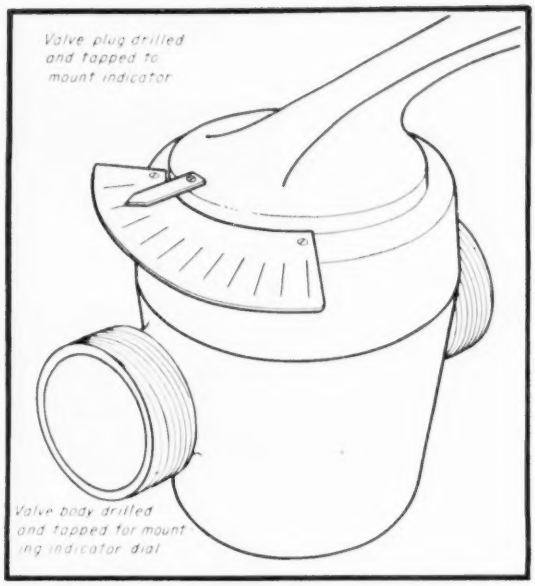
Truck Road Repairs in Jiffy Time

The big fleet-owner problem—speedy repairs of trucks down on the road—has been practically solved by Hood Dairy Co., Boston, through use of plywood "road boards," to which are attached spare parts (see sketch), to replace those which are most likely to fail.

Now, since a sufficient supply of boards is kept in readiness for each make and size of truck, time required for emergency repairs is minimized.

When a call is sent in, the driver of a stranded truck reports vehicle number, location and—to the best of his knowledge—what is wrong with the equipment. The repairman, knowing vehicle type from its number, immediately selects the road board for that particular truck, and can start for the disabled vehicle in a few minutes. He also takes with him a can of gasoline and a freshly charged battery.

Now, it is seldom a truck has to be towed in, or cannot be repaired on the road in minimum time and without damage to product.—*F. E. Staff.*

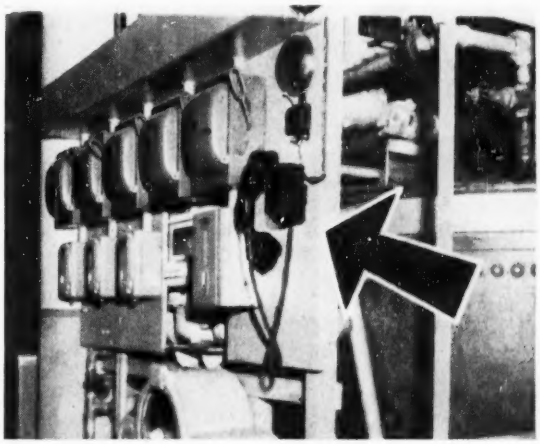


Dial on Valve Indicates Line Flow

By either of two methods it is a simple operation to add an indicating device to plug valves so that flow of liquid in any line or assembly can be regulated.

One way is to tap body and plug (see sketch), attaching a calibrated dial to body and indicator arm to plug.

Simplest and most sanitary way is to file a single indicating mark on the plug and also file 7 or 9 calibrated marks on the body.—*Cherry-Burrell Corp., Chicago.*

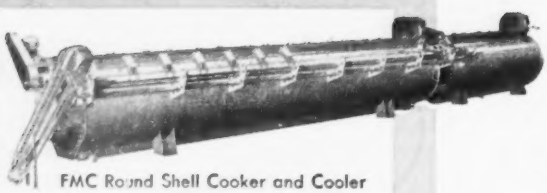


Phone System Avoids Errors

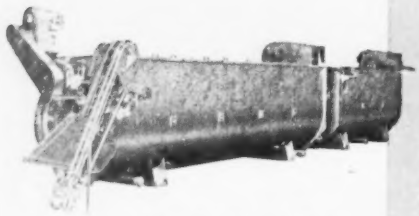
Separate phones, independent of central switchboard and plant communication system, have proved helpful in our plant in avoiding production delays, mishaps and errors.

One phone unit is installed on a motor-control panel (see photo) at the station where products are prepared in a battery of kettles. Connecting phone is on the floor below where finished product is filled into containers.

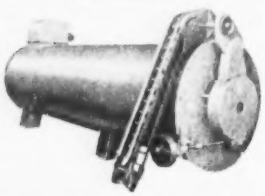
Merely lifting receivers connects two stations. Telephone bells, with alarm heard above factory noise, are operated by push buttons. Instructions are rapidly transmitted, emergencies avoided through use of these low cost communication systems.—*D. Bradshaw, Plant Engineer, H. A. Johnson Co., Boston.*



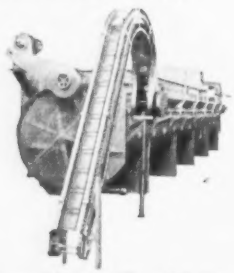
FMC Round Shell Cooker and Cooler with variable inlet



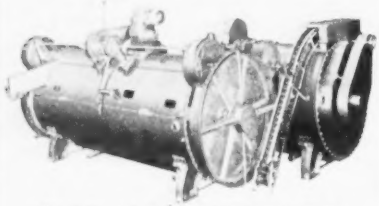
FMC Round Bottom Cooker and Cooler with single inlet



FMC Round Shell Cooker or Cooler with left side positive feed



FMC Large Diameter Round Bottom, High Capacity Cooker and Cooler



FMC Round Shell, High Speed, High Capacity Cooker and Cooler with positive transfer valve

It Takes

fmc Engineered Quality

For Best Results in

CONTINUOUS ATMOSPHERIC COOKING & COOLING

These Features Tell Why

- **Designed for atmospheric processing (up to 212° F)**—the ideal equipment for foods where high temperature processing is not required.
- **Precision-built throughout**—with extra-heavy welded steel plate shells for durability. Accepted as the standard of quality throughout the industry.
- **Choice of round-shell and round-bottom types**—to best fit your capacity and space requirements.
- **Highest speeds in atmospheric cooking**—various types to handle speeds from 10 to 450 CPM, depending on can size.
- **Specially rolled spiral tees**—exclusive FMC tee design provides smooth can progression from feed to extractor—with full can protection all the way.
- **Lubricated drive is OUTSIDE the shell**—removed from water and steam damage, and easily accessible for servicing.
- **Several types of elevators**—gravity and positive feed types can be furnished on most models.

Write for full information, or call your nearest FMC representative.

Key to food equipment

fmc

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Canning Machinery Division

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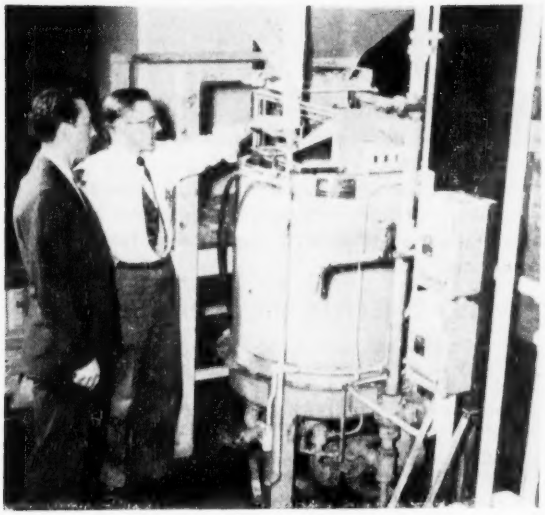
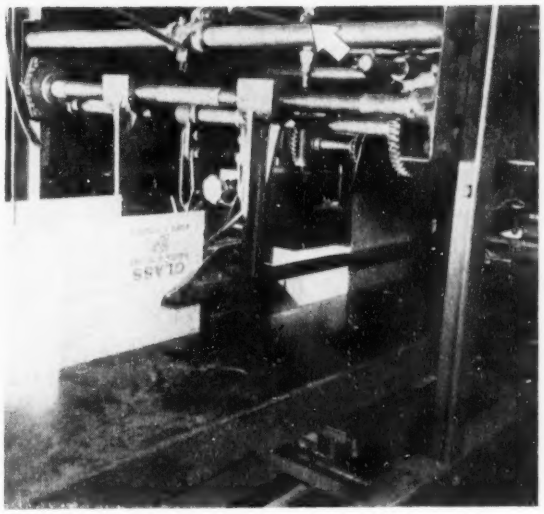




Adhesive Cost Cut With Dry Glue

Newly installed at one of Kraft Food Company's Chicago plants, an automatic shipping-case glue-maker is expected to pay for itself in less than two years, merely through savings in the cost of glue. In addition this new system provides these advantages:

1. Storage space required for glue is 60 percent less.
2. Glue handling costs are cut to one sixth.
3. Waste due to drying, crusting and lumping of glue and to spillage is eliminated.
4. Correct glue viscosity is automatically maintained.

In former method liquid glue was purchased in drums, stored, and manually mixed to case sealing consistency in an area remote from sealers to which glue was manually transported.

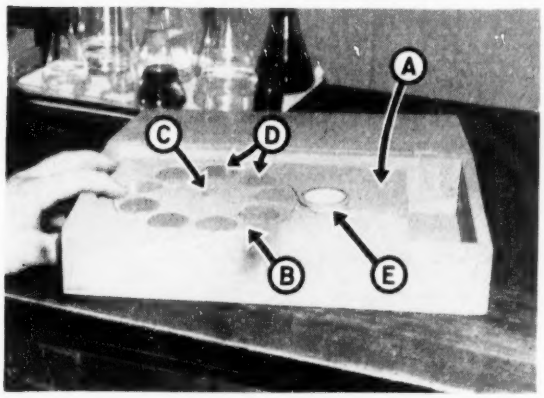
Problems introduced by this conventional system included those of cost, time, sanitation and quality control.

Now, an automatic, Visco-Mat glue maker (Triangle Packaging Machine Co.) has been installed to continuously prepare glue of automatically controlled viscosity from dehydrated glue powder. Latter product, delivered in bags, can be stored in much less space than liquid glue procured in drums, and requires no investment in drum deposits.

Adhesive maker (see left photo) includes, at the top, a hopper for glue powder, and next a water and glue mixing chute which empties into a high-low level controlled, 115 gal. liquid holding reservoir.

Prepared glue is pumped to each of six case sealing stations through a 350 ft. circulating system of 1½ in. pipe. From this pipe glue of uniform consistency is drawn by hand operated valve (see right photo) to fill gluing machine reservoirs as needed.

Floor space requirements for glue maker are 4 ft. by 4 ft.—*R. L. Muskat, Packaging Consultant.*



Efficient Color Checking Device

Accurate color determination is speeded in our laboratory by means of a measuring unit of our own design.

This is how device is constructed and operates.

Into a block of wood—(A) in photo—a circular trough is turned. Circular disk (B) mounted on a shaft (C) at its center, is fitted into this depression. Circular recesses are also cut into disk near edge. These are large enough to accommodate poker chips flush with the disk's surface.

Chips (D), made of plastic, are prepared in varying shades of color as desired, to provide an adequate color comparison scale.

Also cut into block of wood, adjacent to movable disk, is another circular recess containing a small porcelain disk (E) with sample to be identified by color. As the disk is rotated each colored chip is brought close to sample for accurate comparison.

Sets of chips are procured for color range of each product to be checked. These, numbered on one side, are placed numbered side down. Thus, when comparison is made, number does not confuse or influence the checker.

Method is both rapid and efficient.—*Dave Ealkin, Gerber's Baby Foods, Oakland, Calif.*

Durable, Economical Lab. Table Top

During the process of setting up new laboratory facilities we found need for applying a cheap, yet serviceable surface on laboratory work tables.

After a year's use the finish applied is still in excellent condition. Here's how it was done.

The table was first covered with ¾ in. pressed asbestos board which had a smooth, hard surface, but one not resistant to spotting from use of normal laboratory reagents.

This board was then finished with "the black acid-proof stain" which was in common use a number of years ago. Treatment ingredients are made as follows:

Get the ONE BEST Adhesive for the job!

Don't take chances on the packaging adhesives you use! Let our skilled laboratory staff study your problems and *prescribe* the one best adhesive for each specific labeling or sealing operation in your plant. That's the sure way . . the safe, modern, economical way to buy the glues, pastes or cements you need. PAISLEY Scientific Adhesive Service helps you eliminate loose, torn, unsightly packages due to using the wrong adhesive. And it protects you against lack of uniformity and poor quality thru *"continuous control"* . . a laboratory method of insuring that each succeeding shipment measures up to the same high standards of uniform fine quality and performance.

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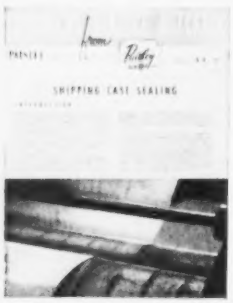

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- ☐ Grip-Tight Label Paste Bulletin
- ☐ Adhesive Operation Data Sheet
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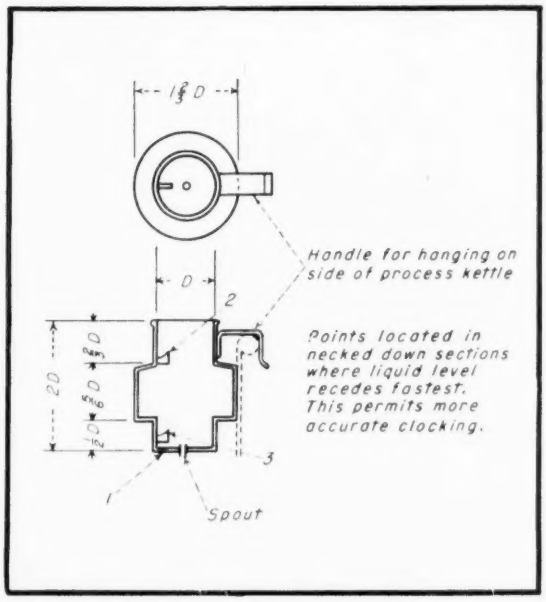
Manufacturers of Glues, Pastes, Resin Adhesives, Cements and Related Chemical Products

Solution No. 1: Copper sulfate (125 grams) and potassium chlorate (125 grams), dissolved in 1000 ml. water.

Solution No. 2: Analine hydrochloride (60 grams) and hydrochloric acid sp. g. 1.20 (90 ml.), dissolved in 500 ml. water.

The surface was first painted heavily with solution No. 1 and then, as soon as dry, painted with solution No. 2. Next day both applications were repeated and again on the following day. At this point in the treatment, the surface which was dark green, was washed to remove loose crystals.

Table top was finished by rubbing with raw linseed oil (2 coats one day apart) to bring out jet black color and build up a hard linseed oil finish. Finally, after a couple of days curing time, the finish was given a coating of paste furniture wax.—*Paul W. Holder, Chief Chemist, Loblaw Inc., Buffalo.*



Homemade Viscosity Instrument

Extremely accurate relative viscosity measurements can be obtained at the processing station, using a stop watch and a home-made fluid flow measuring device.

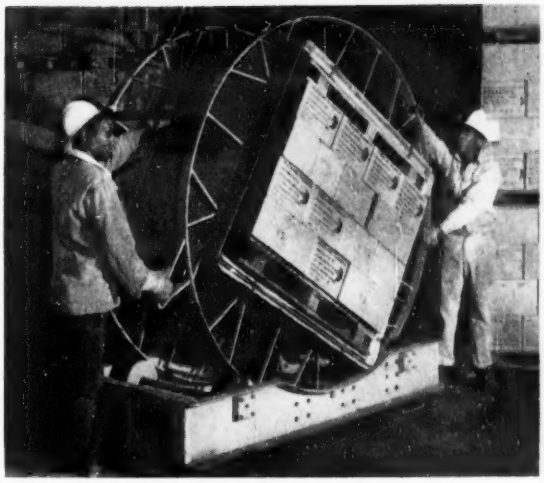
To make a determination, fill the instrument—(1) in sketch—with liquid to be tested. The spout or draw-off orifice is never closed.

Now, when receeding level of liquid arrives at the upper control indicator (2), there will be a sudden distortion of the liquid surface. This will be apparent because of bending of the high-light pattern always present on a tranquil liquid surface.

This sudden surface-light change provides a definite instant of time at which to click the stop watch and begin the measured time interval.

When surface of liquid arrives at level of lower indicator (3), watch is stopped and time interval recorded in seconds. Of course, temperature of liquid tested should always be the same, and furthermore only one device should be employed.

Measuring vessel size, distance between indicator points, inside diameter of spout and its length should be such that the time interval for the particular liquid measured be in the order of 1½ to 2 min.—*P. A. Williams, The W. & F. Manufacturing Co., Inc., Buffalo.*



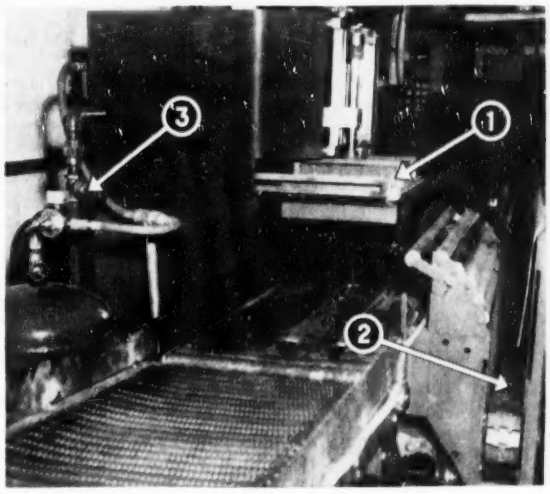
Canned-Milk Case-Turning Simplified

Old hand operation of shifting cases of canned milk monthly to up-side-down position, in order to prevent milk from settling and separating, is now replaced by a mechanical turning of pallet load capacity.

This is how the case-rotator, installed in the Naval Supply Depot at San Diego, is constructed and operated to cut time and labor in half.

An open-ended metal box (see photo), slightly larger than a warehouse pallet and its load of cases, is mounted inside metal hoops which rest on flanged wheels.

To operate mechanical rotator, a loaded pallet is inserted into the open-ended box by fork-lift truck. Then, an empty pallet is placed in the remaining space above the cases. Rolling of hoops on flanged wheels inverts cases, brings top pallet to bottom of stack of cases, to serve as carrier pallet.—*Arthur L. Center, San Diego.*



Magnets Speed Return of Pan Lids

Removing hot lids from pans in which "Pullman"-type bread was baked, is no longer a problem at Purity Baking Co., Charleston, W. Va., since a magnetic device was installed to remove lids.

After covers have been lifted from pans by magnets—(1) in photo—they are transferred to a conveyor (2) for return to oven front. Release of pans is accomplished by compressed air mechanism (3).—*F. E. Staff.*

When the FLAVOR is there -the Customers are too!

Magnify Natural Food Flavor as More and More Leading Food Processors Do . . . with Zest

Your brand will be their favorite if you use *Zest* to produce more satisfying, tastier products. This miracle seasoning—pure Monosodium Glutamate—intensifies natural flavor *already in* canned foods, without adding flavor, aroma or color of its own. Low cost *Zest* is effective in tiny amounts, added either before, during or after processing. Use it in canned soups, fish, stews, vegetables, meats, poultry . . . and scores of other foods. Boosting food flavor with *Zest* is a proven method of increasing volume sales in both canned and frozen foods. Write today for all the details about profit-making *Zest!*

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Staley's 99+% Pure Monosodium Glutamate

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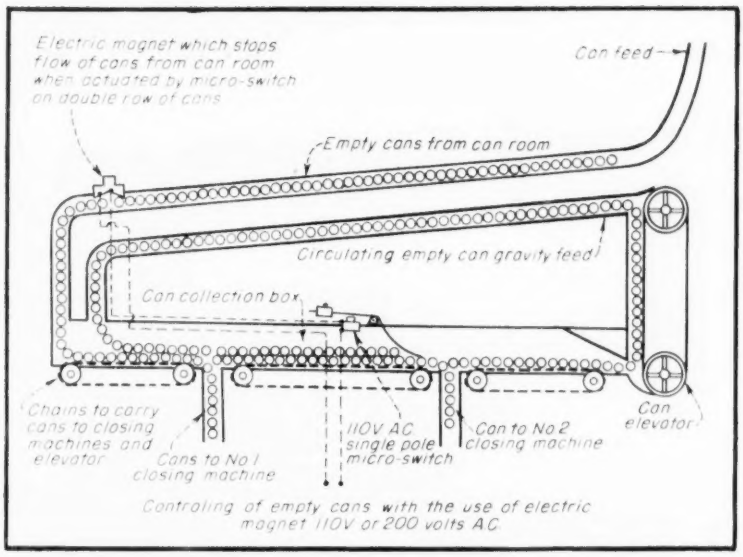
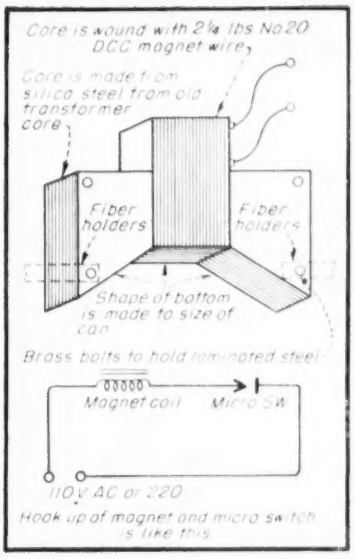
For more information, use coupon on page 159.


Electric magnet which stops flow of cans from can room when actuated by micro-switch on double row of cans
Can feed
Empty cans from can room
Circulating empty can gravity feed
Can collection box
Chains to carry cans to closing machines and elevator
Cans to No 1 closing machine
110V AC single pole micro-switch
Can to No 2 closing machine
Can elevator
Controling of empty cans with the use of electric magnet 110V or 200 volts AC


Core is wound with 2¼ lbs No 20 DCC magnet wire
Core is made from silica steel from old transformer core
Fiber holders
Fiber holders
Shape of bottom is made to size of can
Brass bolts to hold laminated steel
Magnet coil
Micro SW
110V AC or 220
Hook up of magnet and micro switch is like this

Prevents Can Injury in Accumulator

With the installation of a homemade magnet, energized by a micro-switch control (see left sketch) we now avoid former empty can damage and serious loss of production time due to overloading of can line accumulator.

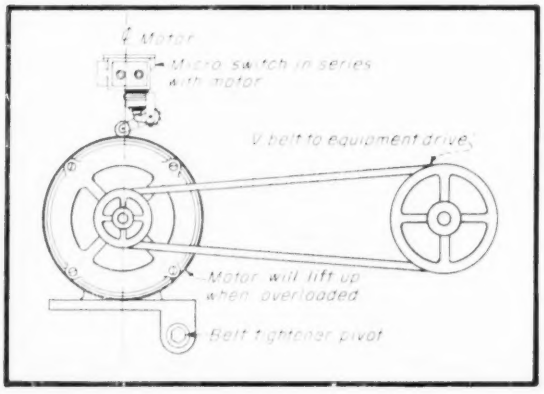
Here's how magnet was constructed and how control assembly prevents accumulator over-crowding.

Approximately 8 lb. of laminated ⅛ in. thick silica-steel plates from old transformers and starters were cut in the shape of a flat bottomed V (see right sketch) spaced to fit the size can to be fed to the accumulator.

Around the sheets as shown in right sketch was wound 2¼ lb. No. 20 double cotton insulated magnet wire. Completed magnet was installed on can feed line ahead of accumulator, and wired as shown in same sketch.

Then, installed between the feeds to filling closing lines, was a control assembly consisting of a micro switch and counterbalanced pivoted arm which rests on line of empty cans. When accumulator starts over-filling, double level of cans lifts pivoted lever, trips micro to energized magnet. Latter then halts feed of cans to accumulator. When overcrowding has ended, normal operations are restored.

System has been in efficient operation for more than 3 years, during which time magnet has never overheated.—*Robert R. Williams, Sr., Hunt Foods, Inc., Bridgeton, N. J.*


Motor
Micro switch in series with motor
V belt to equipment drive
Motor will lift up when overloaded
Belt tightener pivot

Simple Safety Drive

Here's an easily installed inexpensive method of preventing damage to motors from overload, and a dependable means of stopping a motor should a worker's clothes be caught in belt or chain drive:

First, install a pivot type motor base (see sketch) maintaining tension not only on the drive, but also lifting motor in the event of overload.

Next, locate a micro switch immediately above motor with the axis of its contact roller on a vertical line through the motor shaft center. Then, connect micro in series with the motor circuit.

Now, when motor is lifted due to overload, micro switch is actuated, breaking the motor circuit.—*F. E. Staff.*

$50 Extra for Best Item

You are invited to submit Practical Ideas. You will be paid at regular rates when your item is printed, and if it is judged best for the month, you will get an additional payment of $50.

Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and author's name will be cited (see below).

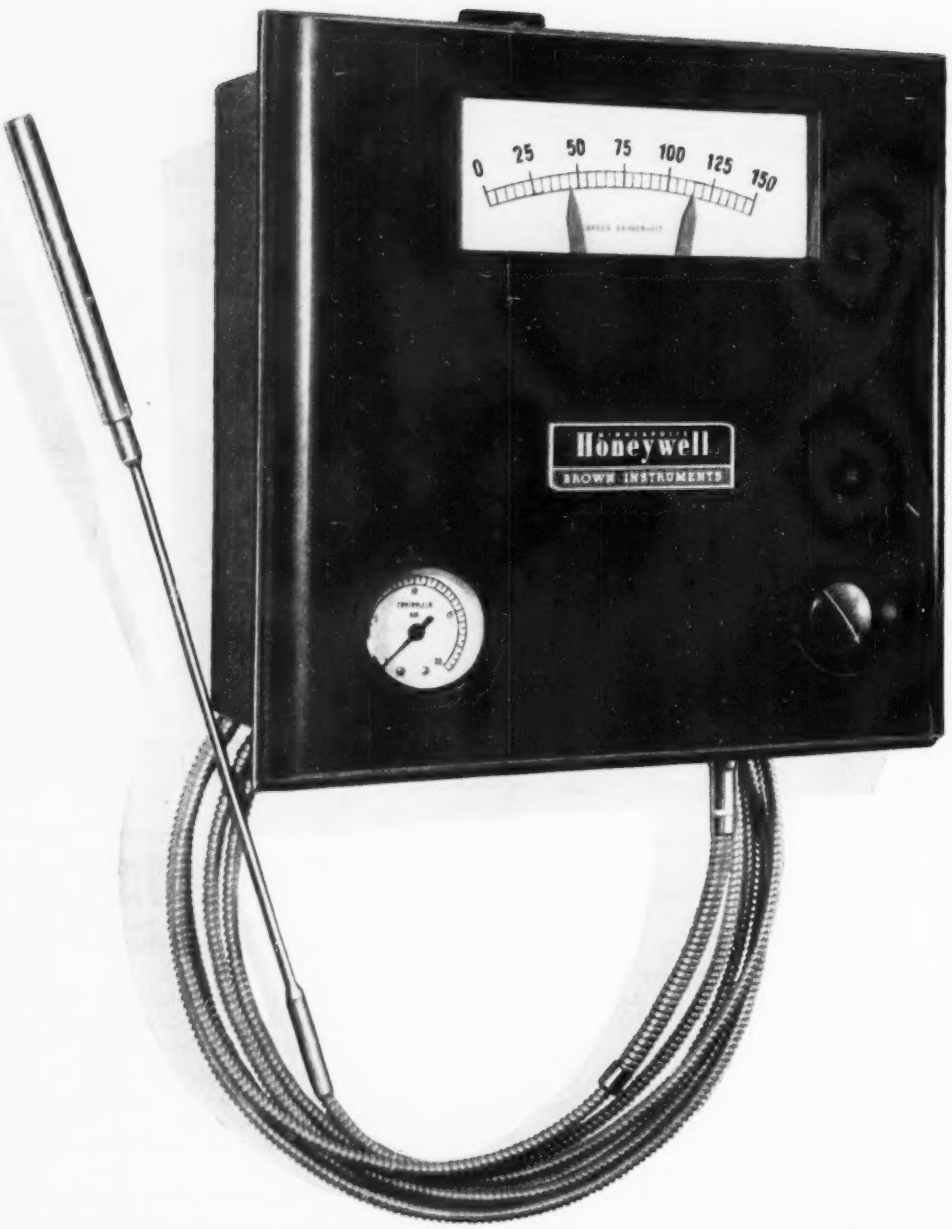
Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry.

Ideas concerning management, maintenance, trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

Send your items to: Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

SEPTEMBER PRACTICAL IDEA voted best was "Speeds Cleaning of Jar Filler", contributed by Correl Morton and William Nixon, Gerber Products Co., Freemont, Mich. Described was a table made up of removable 3 in. planks in which holes were cut to size to receive all parts of filler disassembled for cleaning, thus protecting them from damage, preventing their loss, and speeding cleaning of machine.



Look at these features of the Model 604P5 Thermometer Controller

GOOD READABILITY:
indicates temperature on 4½" scale.

QUICK CONTROL CHECK:
readily visible red control pointer and black indicating pointer.

CONTROL AIR CHECK:
front-mounted gauge indicates air pressure to control valve.

VARIETY OF CONTROL:
direct or reverse acting pneumatic control —either on-off or proportional action.

SELECTION OF RANGES:
23 different temperature ranges, up to 1000°F., in Fahrenheit and Centigrade calibrations, for vapor and mercury bulb systems.

COMPACT DESIGN:
die cast aluminum case 11" x 11", 4" deep; gasketed black plastic cover; practically splashproof. Interchangeable flush or surface mounting on panels of any thickness.

SIMPLE SETTING:
external knob for adjusting control point.

A new, low-cost temperature controller *from Honeywell*

MANY processes which now use manual control can utilize the advantages of automatic operation at unusually low cost—by employing the new Brown Pneumatic Thermometer Controller.

For the scores of ovens, vats, dryers and similar equipment which need only temperature indication and relatively simple control, this new instrument affords excellent control performance. It's fast, accurate . . . and simple in design. It takes so little space that it can fit readily into existing equipment or on panels.

Instrument and thermal system are complete in one package. The set point is easily adjusted by means of an external knob. The selection of control actions, ranges and types of thermometer bulbs covers literally hundreds of control applications throughout industry.

In spite of its low price, this controller is a precision-built instrument which incorporates many of the long-lasting, high-quality components used in other Honeywell products. And it's backed by Honeywell's nationwide service organization, strategically located in more than 90 principal cities of the United States and Canada.

Our local sales engineer will be glad to discuss how this new controller can be applied to your own temperature problems. Call him today . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4502, Wayne Ave., Philadelphia 44, Pa.

● **REFERENCE DATA: Write for your copy of new Bulletin 6401.**

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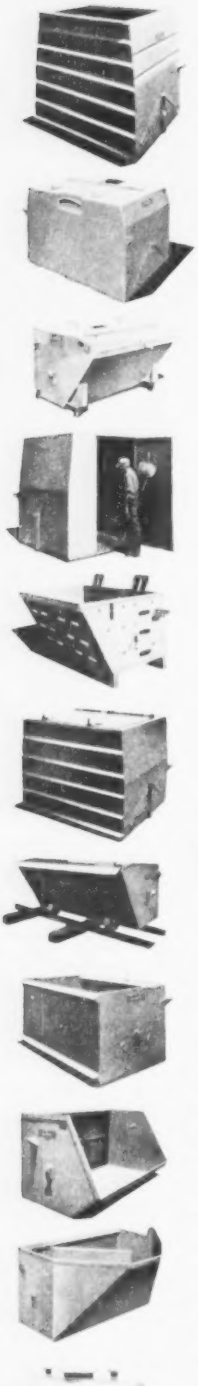

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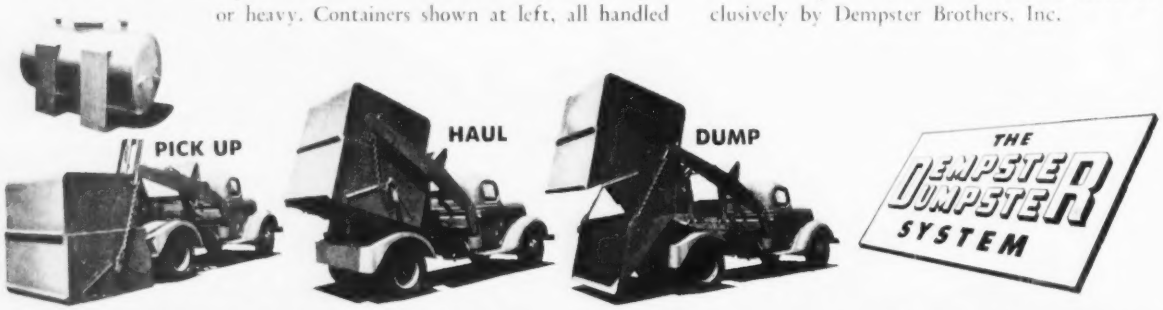

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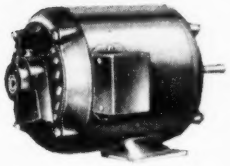


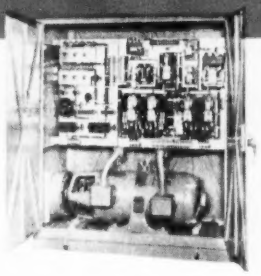
SINGLE PHASE:

Split Phase Induction—⅛, ¼, ⅓ H. P.

Capacitor—⅛ to 20 H. P.
Repulsion start, brush lifting, induction—½ to 20 H. P.

Write for Bulletin Nos.:

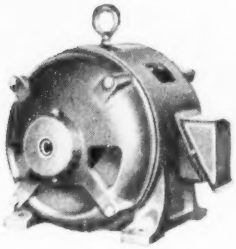
Split Phase 1-5P1
Capacitor 1-1P3
Repulsion Start 2-1P1



SELECTIVE SPEED DRIVE:

A complete line of adjustable speed drives for coordinating all kinds of production processes.

Write for Bulletin No. 11-1P1



POLYPHASE:

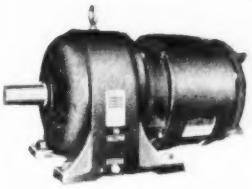
Squirrel Cage Induction—⅛ to 400 H. P.

Wound Rotor Motors—1 to 400 H. P.

Synchronous Motors—20 to 150 H. P.

Write for Bulletin Nos.:

Squirrel Cage, Drip Proof—6-1P1
Squirrel Cage, Splash Proof—6-1P3
Squirrel Cage, Enclosed Fan Cooled—6-1P41
Squirrel Cage, Explosion Proof—6-1P45
Wound Rotor—6-3P1
Synchronous—6-5P1

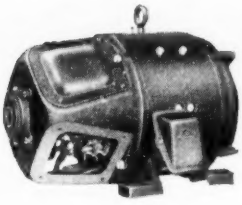


GEAR MOTORS:

⅛ to 15 H. P., single, double and triple gear reduction.

Write for Bulletin Nos.:

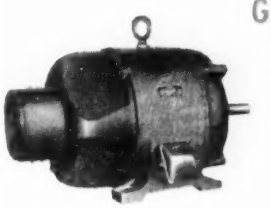
⅛ to ¾ H. P. . 4-5P21-61
1 to 15 H. P. . . 4-1P31



DIRECT CURRENT:

All capacities—⅛ to 300 H. P.

Write for Bulletin No. 10-1P1



GENERATORS:

AC, .63 to 250 KVA
DC, .75 to 200 KW

Write for Bulletin Nos.:

AC, .63 to 250 KVA—18-1P21
DC, .75 to 200 KW—18-1P1

CE-825

Motors listed above are available in Open Rated Drip Proof, Splash Proof, Totally Enclosed Fan Cooled and Explosion Proof frames—and with a dozen different methods of mounting. They are unusually quiet starting and running and unusually free from vibration.

CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

Send the Coupon for Additional Facts

To CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis 3, Mo.

Please send me the following bulletins:
(fill in numbers here) .....

Name ..... Title .....
Company .....
Address .....
City ..... Zone ..... State .....

For more information, use coupon on page 159.

tough

VISQUEEN®

DOESN'T SPLIT, CRACK, SHATTER OR RUN!

You gain two ways with **VISQUEEN.** Your produce *looks* better because **VISQUEEN** stands up under severe handling. Your produce *is* better because **VISQUEEN** inhibits spoilage, protects against marring, marking and bruising.

VISQUEEN can be sealed with heat, taped, tied, sewn or stapled. There's no blocking to slow down packaging lines. **VISQUEEN's** superior slip actually speeds packaging operations.

VISQUEEN "C" was created for permanent ink adhesion. The ink stays on. There is no substitute for **VISQUEEN "C".** It is produced by a VISKING process. It loses none of its durability because it's printable.

A converter of **VISQUEEN** film can help you, whatever your packaging problem. He's backed by Visking's superior know-how. Use the coupon for aid in your packaging problems.

VisQueen® film...a product of

THE VISKING CORPORATION

World's largest producers of polyethylene sheeting and tubing

Plastics Division, Terre Haute, Indiana

In Canada: Visking Ltd., Lindsay, Ontario

Important! VISQUEEN film is all polyethylene, but not all polyethylene is VISQUEEN. VISQUEEN film is produced by process of U. S. Patents No. 2461975 and 2632206. Only VISQUEEN has the benefit of research and technical experience of The Visking Corporation, pioneers in the development of pure polyethylene film.

THE VISKING CORPORATION, BOX R11-1410, Plastics Division, Terre Haute, Indiana

Please send me names of converters of VISQUEEN film serving my area.

Name _____ Company _____

Address _____ City _____ Zone _____ State _____

For more information, use coupon on page 159.

Sealva

THE NEW HERMETICALLY SEALED FLAVORS!

Sealva flavors are protected against the ravages of oxidation and atmospheric change. Sealva processed flavors appear physically as powders, yet in reality they are minute droplets of pure flavor individually hermetically sealed.

Flavor oils show no appreciable change in pure fresh character after a year's aging in Sealva form. The recently developed Sealva flavors have already achieved an amazing reputation in the dry pack food field.

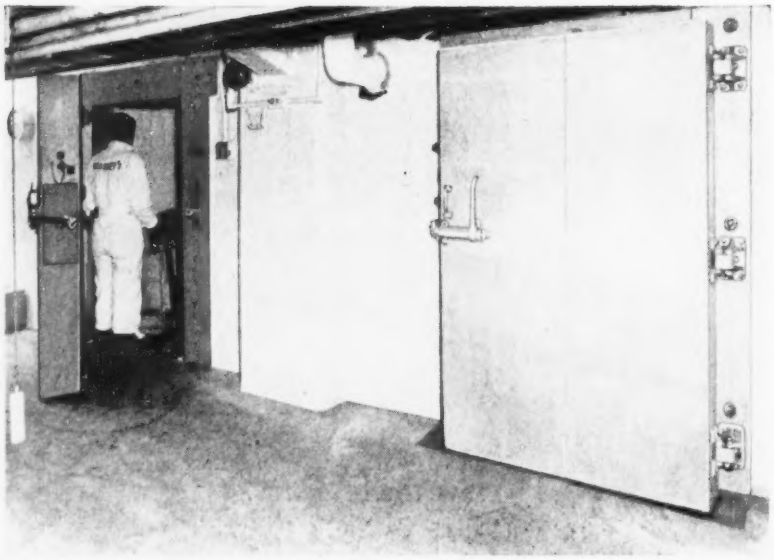
Samples, technical bulletins, and recommendations will be forwarded at your request.

VAN AMERINGEN-HAEBLER, INC.
521 WEST 57th STREET • NEW YORK 19, N. Y.

Alva FLAVORS

For more information, use coupon on page 159.

Shown here are just three of hundreds of Jamison installations in dairies all over the country. For greatest efficiency and long trouble-free operation, be sure to specify Jamison Cold Storage Doors.

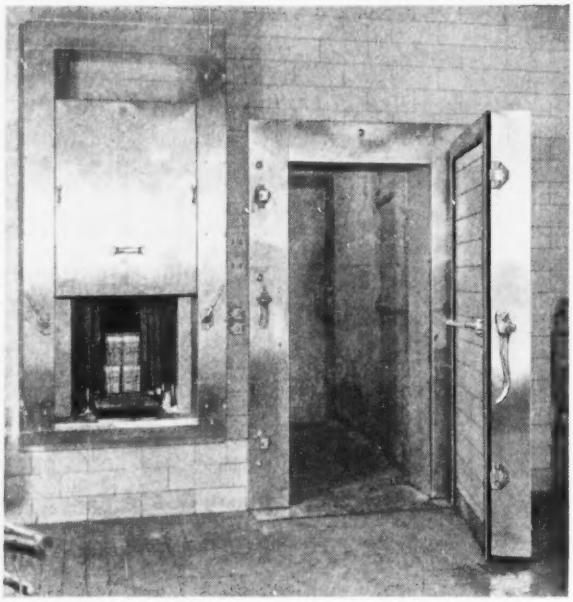


Tighter Seals—Easier Operation—Eye-Catching Appearance Make JAMISON Doors Top Choice for Top Flight Dairies

Tighter sealing at all times is just one reason why Jamison Doors are better for storage or sharp freezing as low as −40°. Special Jamison hinges and fasteners assure a tight seal. Greater refrigeration efficiency is maintained more easily.

Easy opening and closing of Jamison Doors helps speed materials handling . . . by hand, hand-truck or mechanical means. For example, the vertical sliding door shown at the right enables a dairy to handle 1,000 gallons of ice cream per hour in pint containers—without undue refrigeration loss.

Showmanship aids sales. Jamison stainless clad doors are eye-catchers that help pull customers in—keep them coming back. They look clean—are clean—are easier to keep clean. Get all the advantages of the better doors made by the JAMISON COLD STORAGE DOOR CO., HAGERSTOWN, MARYLAND.



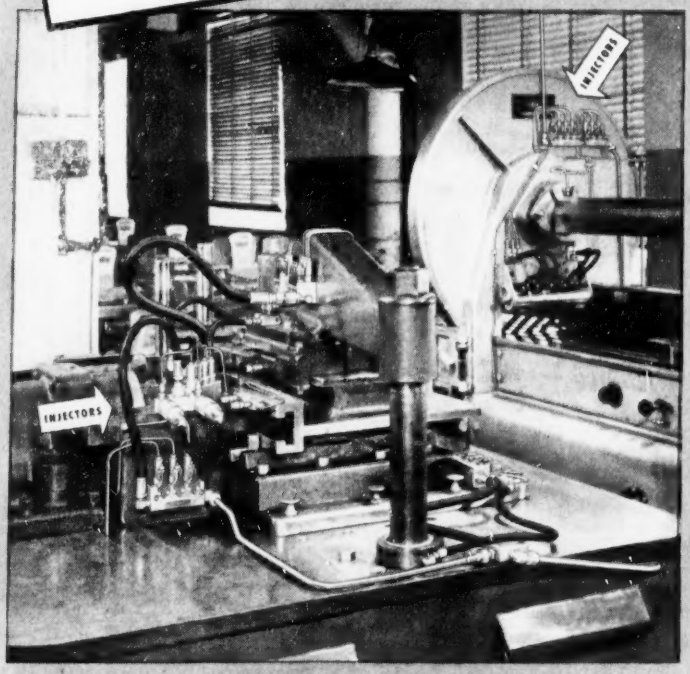
JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

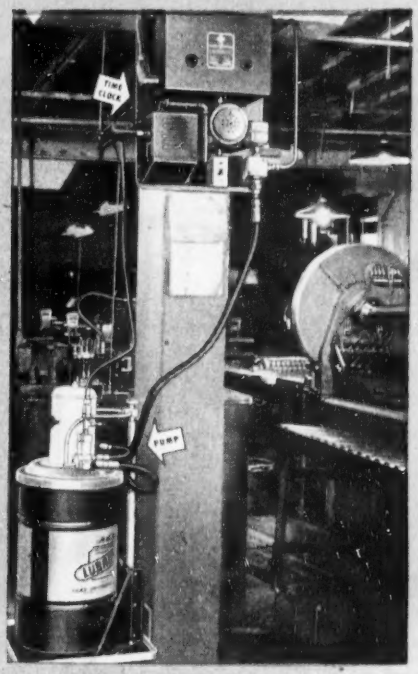
The leader for over 50 years

Cudahy Brothers, Cudahy, Wis. get an EXTRA HOUR of production EVERY DAY from presses, slicers and conveyors equipped with.....

Lincoln CENTRALIZED LUBRICATION SYSTEMS



Arrows point out part of a circuit of SL-1 injectors serving a Bacon Press and Slicer.



Closeup of the Model 1823 Air-Motor Operated Drum Pump that is time clock controlled to automatically assure the right lubricant, in the right quantity, at the right time to all bearings on Presses, Slicers and Conveyors, simultaneously.

The first Lincoln Automatic Lubrication System was installed on a Press and Slicer in January, 1951. Seven months later the improvement on this machine was so impressive that Lincoln Centralized Systems were added to three more Presses, Slicers and Conveyors.

Today, downtime has been eliminated on these machines that formerly had to be shut down one hour each day for lubrication. Production has gone up and lubricant consumption has been reduced by 50%. Also, the sealed lubrication lines eliminate the danger of food contamination from excess grease.

FOR SMOOTHER RUNNING PRODUCTION **at reduced cost, investigate the possibilities of Controlled Lubricant Application through Lincoln Centralized Lubricant Application Systems. Write for your free copy of Catalog 80 giving complete facts.**

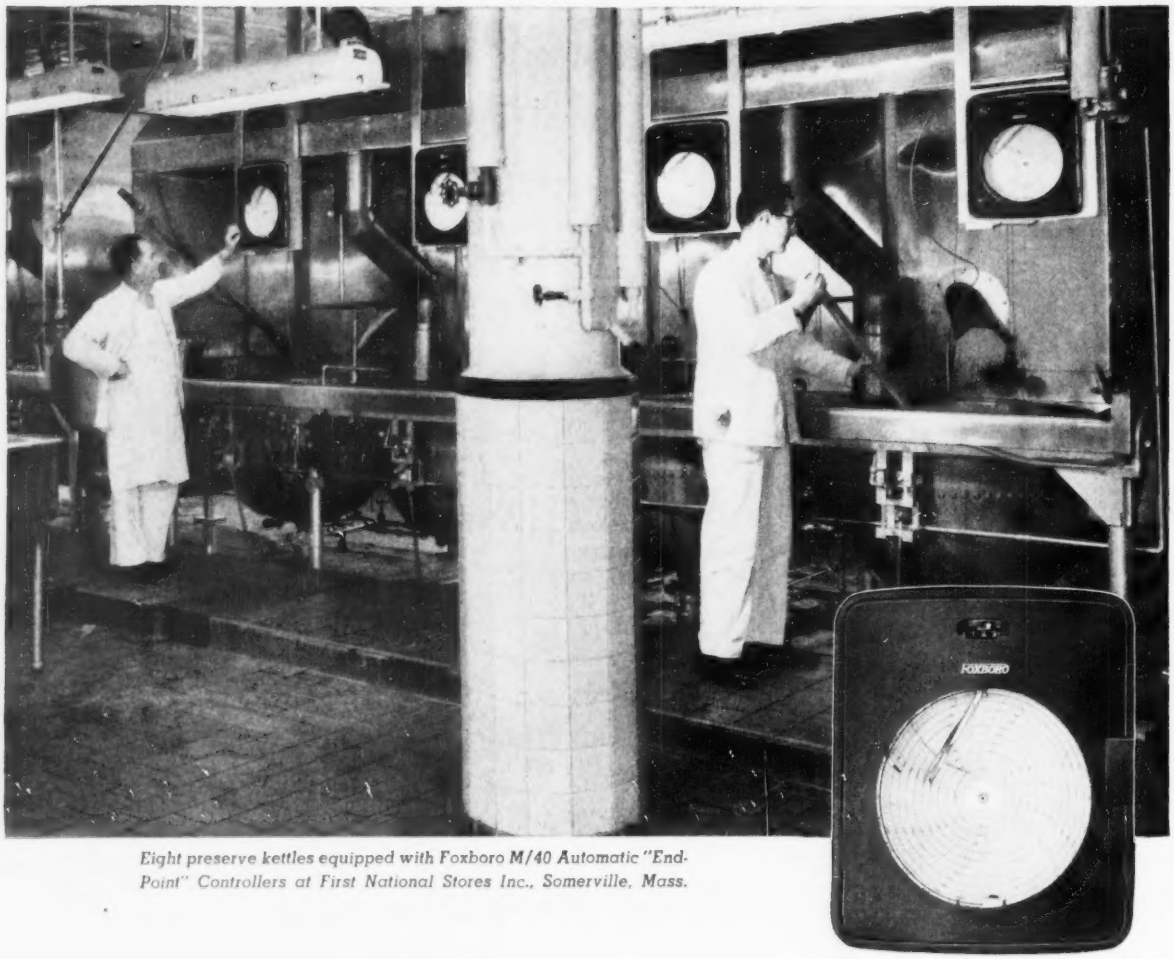
• • • PIONEER BUILDERS
LINCOLN ST. LOUIS
LUBRICATING EQUIPMENT • • •

LINCOLN ENGINEERING COMPANY
5781 Natural Bridge Ave., St. Louis 20, Missouri

For more information, use coupon on page 159.

FINAST jam quality

insured by accurate "end-point" control



Eight preserve kettles equipped with Foxboro M/40 Automatic "End-Point" Controllers at First National Stores Inc., Somerville, Mass.

At First National Stores plant in Somerville, Mass., the solids content of jams is held precisely above the prescribed minimum by Foxboro Temperature Controllers. As the jam boils it loses water and increases the solids content which in turn raises the boiling point, thus causing a temperature rise.

When the jam reaches the predetermined temperature indicating correct percent solids, the Foxboro Controllers shut down the process.

By sensing this critical "end-point" temperature to within ±¼°F., the controllers assure product uniformity from batch to batch, maximum production economy and efficiency.

When you have a food processing problem, take advantage of Foxboro's long and varied experience in this field. Let your nearby Foxboro Field Engineer help you.

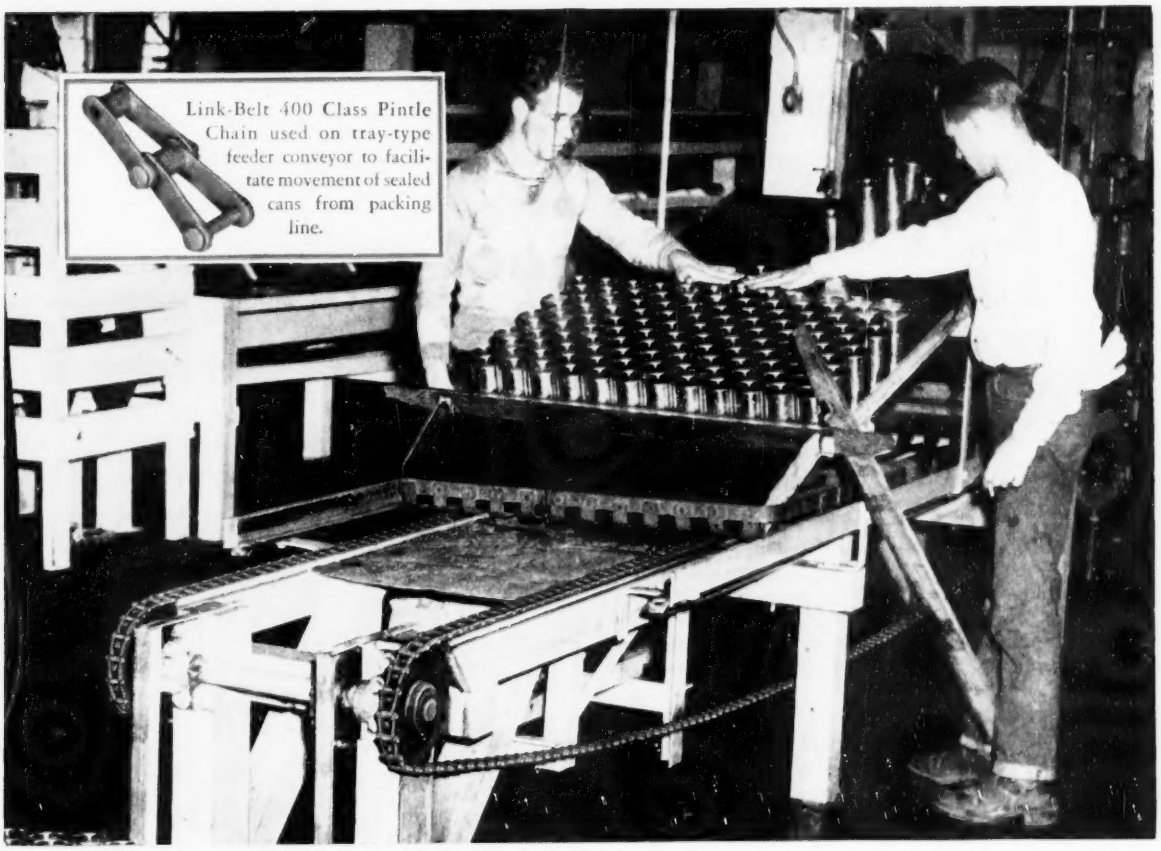
THE FOXBORO COMPANY, 3011 NEPONSET AVE., FOXBORO, MASS., U. S. A.

FOXBORO
REG. U. S. PAT. OFF.

INSTRUMENTS THAT IMPROVE Product Quality

FACTORIES IN THE UNITED STATES, CANADA AND ENGLAND

Is there ONE chain that best meets your drive or conveyor problem?



Link-Belt 400 Class Pintle Chain used on tray-type feeder conveyor to facilitate movement of sealed cans from packing line.

You'll find the answer in LINK-BELT's complete chain line... a size and type for every job

The application shown above is an example of how you can select the *one* chain best suited for a particular need from the complete Link-Belt line. And each chain is engineered to provide more efficient service at lower cost than so-called general purpose chain.

Whatever your requirements, you are assured of the *right* chain for the job when you rely on Link-Belt. And, remember—a chain bearing the Link-Belt double >—< arrow is your guarantee of longer chain life.

For information on the complete Link-Belt chain line, see the Link-Belt representative near you. He has the answers for efficient, low-cost drive and conveying chain performance.

LINK-BELT

CHAINS AND SPROCKETS

Typical chains from the complete LINK-BELT line

Ewart Detachable Link-Belt—A widely used, popular chain for average or normal-duty service on conveyors, elevators and drives.

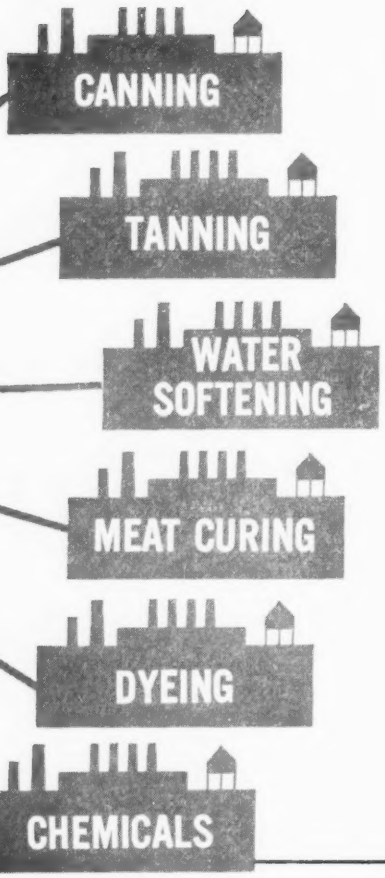
S-815 flat top conveyor chain — economical, sturdy, reliable, easy to detach and to keep clean.

Class 1100 Roller Chain —For rolling conveyors and inclined rolling elevators operating under normal conditions.

Class 400 swivel chain —carries cartons, cases, etc. over paths with horizontal turns.

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13.181-D

For more information, use coupon on page 159.



YOUR INDUSTRY, like so many others, very probably uses brine in its operation.

And now the LIXATE Process, pioneered and developed by the International Salt Company, takes all the complications, all the inaccuracies, all the costly handling out of brine making. You use rock salt—and gravity does all the work.

You just turn a valve and *instantly* you have brine where you need it, when you need it—automatically!

And because this pure brine is *always* 100% saturated, because it *always* contains exactly 2.65 pounds of salt per gallon, your brine measurements are *unfailingly* 100% accurate.

Hundreds of companies have saved thousands of dollars, have improved the quality of their products by installing the LIXATE Process. Let International's Industrial Division help *you*. Send the coupon below, today.

INTERNATIONAL SALT COMPANY, INC.
INDUSTRIAL DIVISION, Scranton 2, Pa.

I am interested in knowing what the *Lixate* Process can do for MY plant. Please have an International Industrial Engineer contact me as soon as possible. I understand there is no cost, no obligation.

FIRM NAME _____

ADDRESS _____

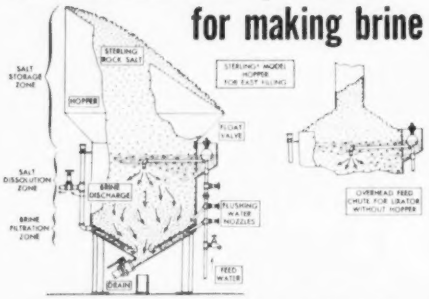
CITY _____ ZONE _____

STATE _____

MY NAME _____

MY TITLE _____

the LIXATE* process for making brine



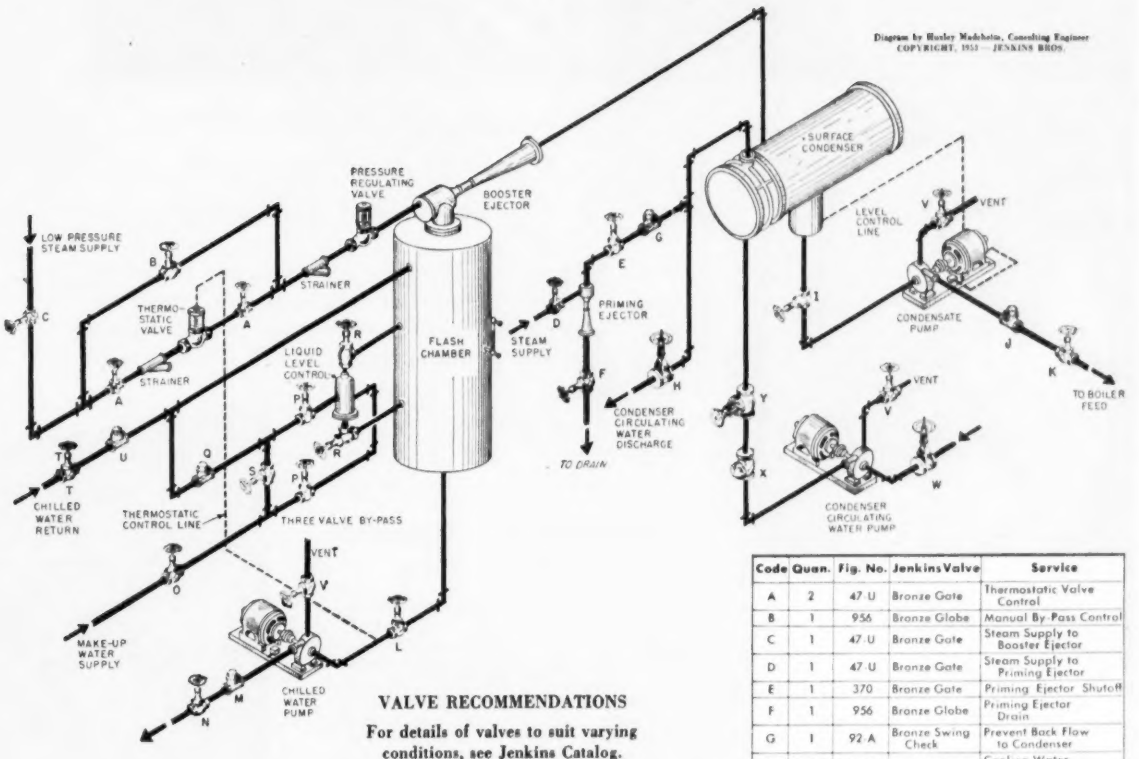
HOW LIXATOR WORKS

In the dissolution zone—flowing through a bed of Sterling Rock Salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. **In the filtration zone**—through use of the *self-filtration* principle *originated by International Salt Company*, the saturated brine is thoroughly filtered through a bed of *un*dissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

INTERNATIONAL SALT CO., INC.
SCRANTON, PENNSYLVANIA

SALES OFFICES: Atlanta, Ga. • Chicago, Ill. New Orleans, La. • Boston, Mass. • St. Louis, Mo. Newark, N. J. • Buffalo, N. Y. • New York, N. Y. Cincinnati, O. • Philadelphia, Pa. • Pittsburgh, Pa. Richmond, Va. • ENGINEERING OFFICES: Atlanta, Ga. Chicago, Ill. • Buffalo, N. Y. *Reg. U. S. Pat. Off.

JENKINS PRACTICAL PIPING LAYOUTS 69



VALVE RECOMMENDATIONS

For details of valves to suit varying conditions, see Jenkins Catalog.

Code	Quan.	Fig. No.	Jenkins Valve	Service
A	2	47 U	Bronze Gate	Thermostatic Valve Control
B	1	956	Bronze Globe	Manual By-Pass Control
C	1	47 U	Bronze Gate	Steam Supply to Booster Ejector
D	1	47 U	Bronze Gate	Steam Supply to Priming Ejector
E	1	370	Bronze Gate	Priming Ejector Shutoff
F	1	956	Bronze Globe	Priming Ejector Drain
G	1	92 A	Bronze Swing Check	Prevent Back Flow to Condenser
H	1	651 A	I.B.B.M. Gate	Cooling Water Discharge Shutoff
I	1	370	Bronze Gate	Condensate Pump Shutdown
J	1	92 A	Bronze Swing Check	Prevent Backflow through Condensate Pump
K	1	106 A	Bronze Globe	Condensate Pump Control
L	1	370	Bronze Gate	Chilled Water Pump Shutdown
M	1	92 A	Bronze Swing Check	Prevent Back Flow Through Pump
N	1	106 A	Bronze Globe	Chilled Water Pump Control
O	1	106 A	Bronze Globe	Make-up Water Control
P	2	370	Bronze Gate	Automatic Valve By-Pass
Q	1	92 A	Bronze Swing Check	Prevent Backflow from Chamber
R	2	108 A	Bronze Angle	Level Control Shutoff
S	1	106 A	Bronze Globe	Manual By Pass Control
T	1	106 A	Bronze Globe	Chilled Water Control
U	1	92 A	Bronze Swing Check	Prevent Backflow Chilled Water Lines
V	1	106 A	Bronze Globe	Pump Vent
W	1	651 A	I.B.B.M. Gate	Condensing Water Pump Shutdown
X	1	624	I.B.B.M. Swing Check	Prevent Backflow to Pump
Y	1	613	I.B.B.M. Globe	Pump Control

How to plan a

STEAM JET REFRIGERATION SYSTEM

The use of steam for air conditioning has increased steadily during the past few years, principally because of the low cost of steam. In plants generating their own steam, demands on the boiler plant are greatly reduced during the summer months, while plants having to purchase district steam usually benefit by reduced summer rates.

In the steam jet system shown, water returned from the chilled water coils of the air conditioning system enters the flash chamber which is maintained at a low pressure by the booster ejector. Here the water is cooled to a temperature corresponding to the boiling point at the reduced pressure. Heat is removed by the flashing of a portion of the returned water to steam which is removed by the ejector.

The booster ejector used in this system requires either a barometric or surface condenser. Pump drives may be either electric or steam turbine, depending upon local operating costs and the size of the installation.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installation.

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering experience, select all the valves you need from the complete Jenkins line. It's your best assurance of *lowest cost in the long run*. Jenkins Bros., 100 Park Ave., New York 17.

• •

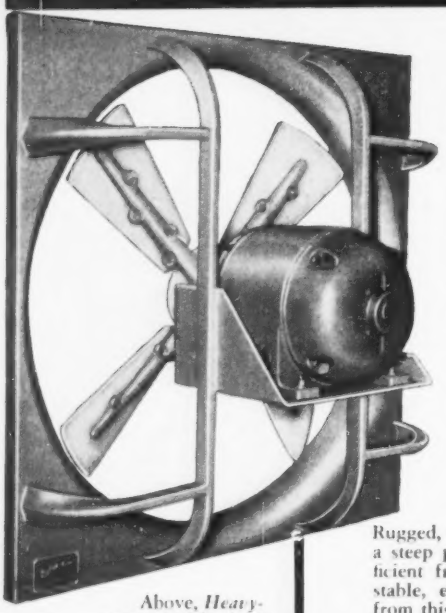
Complete description and enlarged diagram of this layout free on request. Includes additional detailed information. Simply ask for Piping Layout No. 69.

JENKINS
LOOK FOR THE DIAMOND MARK
VALVES
SINCE 1864 TRADE JENKINS MARK

SOLD THROUGH LEADING INDUSTRIAL DISTRIBUTORS EVERYWHERE

BUILT TO HANDLE MORE JOBS BETTER!

These Husky New "Buffalo" DISK FANS



- Many sizes, to 90,000 cfm!
- Free Air or pressures to 1"!
- Easily installed "packages"!

With the development of this improved and broadened line of "Buffalo" Propeller fans, it is now possible to handle many additional ventilating and exhausting jobs with these fans at lower first cost and lower cost installation.

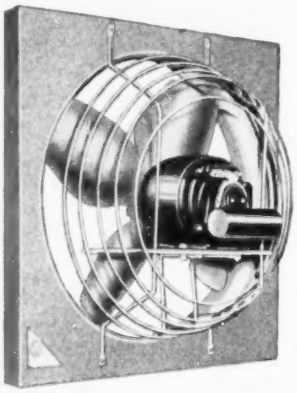
Above, *Heavy-gauge 4-bladed wheels for safe operation at tip speeds up to 13,000 fpm are characteristic of the sturdy construction of Heavy-Duty "NV" Propeller Fans.*

The HEAVY-DUTY TYPE "NV"

Above, is built in 24", 30", 36", 42", 48" and 54" sizes, direct or v-belt drive, for free air delivery or against system resistances as high as 1". Fans may be had with special protective coatings, stainless steel wheels, hard aluminum, Non-Sparking Everdur wheels for handling fumes with moisture, acids, alkalies and various gases. Models for high or low ambient temperatures are available. WRITE FOR BULLETIN F3790.

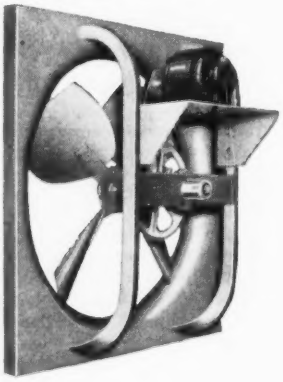
NV-BREEZO "Diamond Jubilee" Fans

Rugged, attractive and eye-appealing, this fan has a steep pressure characteristic combined with efficient free-air performance! Thus, you can get stable, efficient and high capacity performance from this fan in simple wall installations or ventilating systems with ¼" to ½" s.p. The rigid, welded motor-side wire guard is also a firm motor support. May be had in protective coatings, Stainless Steel, #3S Aluminum or Everdur brass for corrosive and/or explosion-proof applications. 8" to 24" sizes. WRITE FOR BULLETIN 3865.



The 24", 30" & 36" BELT-AIR is a top performer from any angle!

Its new sleeve bearing on the fan shaft permits fan operation at any angle from vertical to horizontal, shaft up, and provides quieter vertical shaft operation than ball bearings. Other major design changes provide higher capacities at lower, quieter speeds, and lower power consumption, also as a lay-down unit with motor and bearing assembly on discharge side. Also new Beltairs available in larger sizes 42" thru 84". This line effectively covers ranges from 5000 to 90,000 cfm. One of the units on this page may be just the economical, satisfactory fan you're looking for—WRITE FOR ENGINEERING DATA NOW!



FIRST FOR FANS

BUFFALO FORGE COMPANY

152 MORTIMER ST. BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

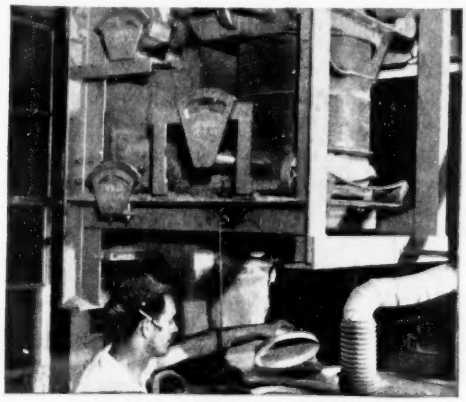
Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING

ADVANCED FERRO-PHOBIA

. . Fer'ro-pho'bia, n. Fear of iron.
It's enough to kill any cost-conscious plant manager—fear of tramp iron damaging equipment, causing shutdowns, ruining product purity.

No couch can cure it, but a Dings Magnet can. When ferro-phobia symptoms—unhappy people moaning about lost production—show up in your plant, phone your representative or write Dings. They'll prepare an effective magnetic Rx, backed by 50 years of experience, that will end the plague in a hurry.



KEEPING BUTTER SALT PURE
Dings induced-roll high-intensity magnetic separators are used by major salt producers to keep there product free of the finest magnetic impurities.

Dings

DINGS MAGNETIC SEPARATOR COMPANY
4741 West Electric Avenue
Milwaukee 46, Wisconsin

DINGS MAGNETIC SEPARATOR COMPANY
4741 West Electric Avenue
Milwaukee 46, Wisconsin

Please send me Catalog C-1205-B on Dings Perma-Plate Magnets and Catalog C-5000-B with data on the complete Dings line.

Name_____ Title_____

Firm_____

Address_____

PP453

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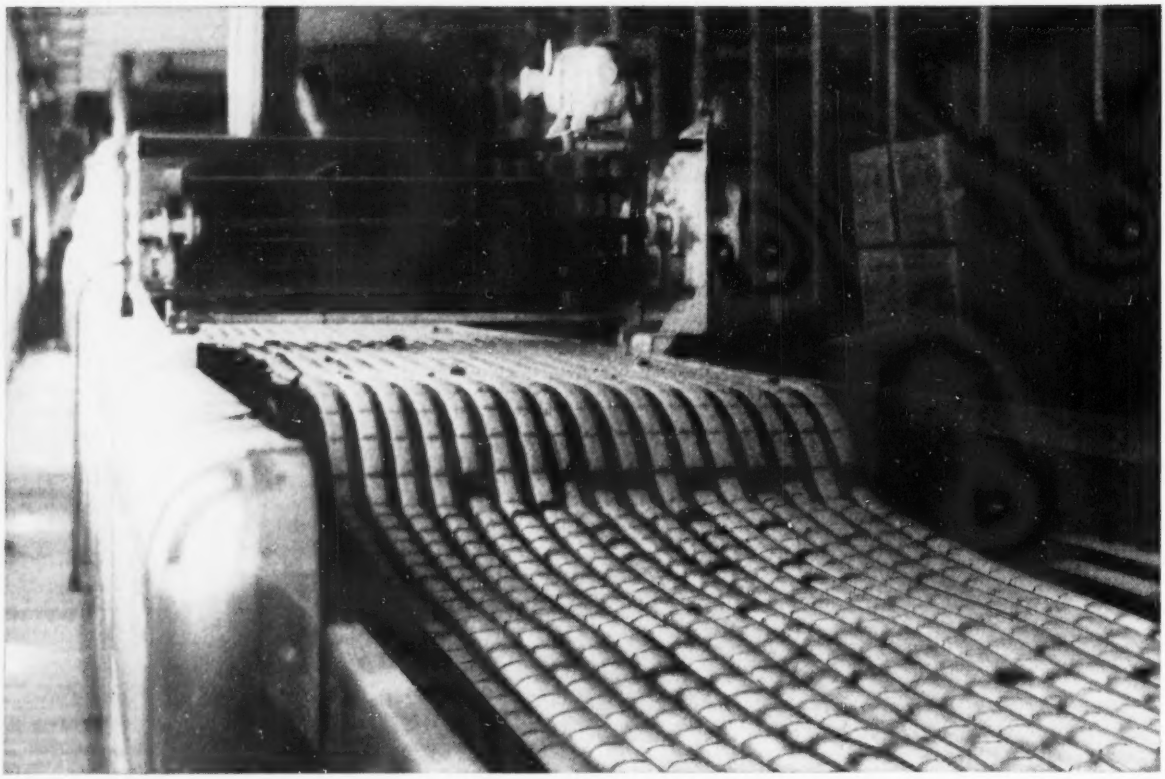
Baking with GAS...



Keeps Production Geared to Sales
Controls Product Freshness and Finish
for Schoenith, Inc., Charlotte, N.C.

A new macaroon formula plus a rearranged production line featuring a continuous output with fewer handlings, resulted in a 25 per cent increase in production for this progressive Southern baker.

To provide the newly arranged production-line with the right baking facilities, a 100-foot Gas-fired Tunnel Oven was built right into the line. The baking cycle requires 12 minutes in this recirculating oven at 420°F this temperature being accurately maintained within plus or minus 2° by the automatic Gas control system.

One of the most important facts about Gas Bake Ovens is further demonstrated by SCHOENITH's use of the same production line for other varieties of cookies. The versatile Gas Oven, with its precise automatic controls, lends itself to quick adjustment of the temperature for baking any of the other cookie varieties which Schoenith, Inc. delivers directly to its customers' doors.

Your baking equipment manufacturer and your Gas Company Representative will be glad to discuss the proper Gas Equipment for maximum efficiency.

MORE AND MORE ... THE TREND IS TO GAS FOR COMMERCIAL BAKING

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK

For more information, use coupon on page 159.

FIRST
in 1000 years

NEVER BEFORE, not even a few short years ago, could the new Fischer & Porter Ratochlor* chlorinator be built!

Why?

Like the jet engine, which could not be born until all the complex alloys and ceramics necessary to resist its great heat were available — like controlled atomic fission, which required complex mathematics and multi-complex mechanics — so the new F & P Ratochlor unit needed many new and complex developments of the laboratory before it could be produced for thoroughly dependable use.

With a cabinet completely formed from polymer-impregnated fiber glass, with Uscolite tubing and fittings, with Kel-F, Teflon, tantalum, and silver components, the 1050 series unit is practically impervious to chlorine corrosion.

Offering complete simplicity of operation and freedom from maintenance problems, the new F & P chlorinator automatically assures maximum water economy over an extra wide flow range.

These are only a few of the many reasons why this new unit is important to every industrial and municipal user of chlorine. It is the result of years of concentration by F & P on the problems inherent in chlorination. Write today for complete descriptive literature which tells the whole story from idea to reality.

Ratochlor units in F & P Hatboro plant awaiting inspection and test ***with chlorine*** under actual operating conditions.

*T.M., F&P Co.

complete process instrumentation

FISCHER & PORTER CO.

4610 County Line Road, Hatboro, Penn.

2260

Company owned sales and service branches strategically located throughout the world.

For more information, use coupon on page 159.

WHAT'S NEW AT BRISTOL . . . . WHAT'S NEW AT BRISTOL

Meet the WORLD'S SIMPLEST INSTRUMENT SYSTEM!

It's Bristol's new METAGRAPHIC pneumatic transmission instrument system, for measuring, indicating, recording and controlling pressure, temperature, vacuum, flow, differential pressure and liquid level.

HERE ARE THE BIG ADVANTAGES OF THE NEW METAGRAPHIC SYSTEM:

1. SIMPLICITY — fewer parts, fewer adjustments, and less service required. Range changes can be made in seconds.

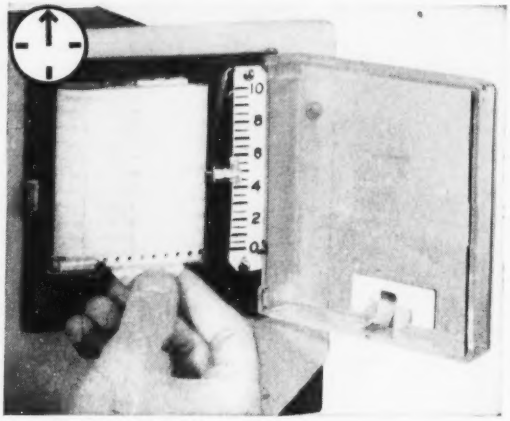
2. FLEXIBILITY — units can be combined like building blocks to make any kind of arrangement.

3. TRUE PLUG-IN SERVICE—results in great savings in installation costs; units can be plugged in or out without stopping process or control.

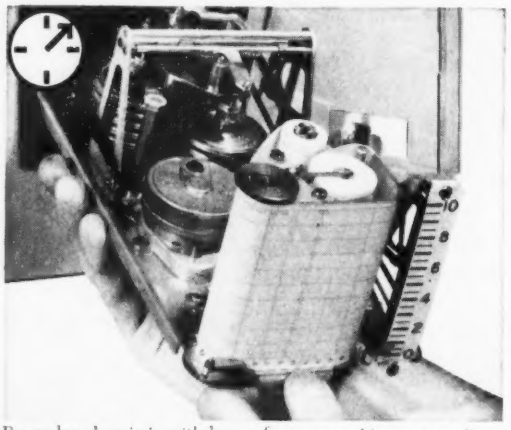
4. NO TIME LAGS—in a four-pipe circuit the transmitter signal and controller-output signal travel around a short loop—as small as three feet.

Get the whole METAGRAPHIC story by writing to The Bristol Company, 115 Bristol Road, Waterbury 20, Conn.

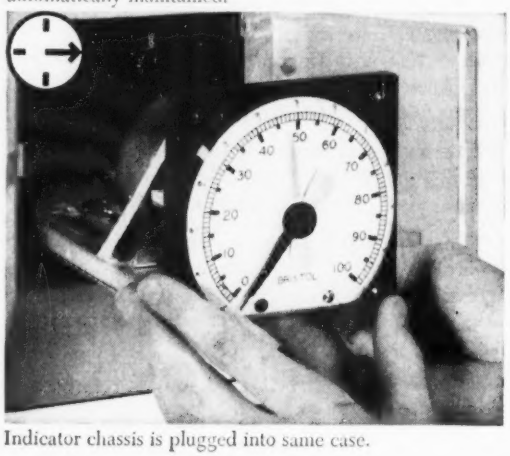
***It takes only fifteen seconds to* change the Bristol METAGRAPHIC recorder to an indicator!**



Case door is opened.



Recorder chassis is withdrawn from case. Air pressure is automatically maintained.



Indicator chassis is plugged into same case.

LOOK FOR OUTSTANDING NEW DEVELOPMENTS FROM BRISTOL

BRISTOL

THE DEPENDABLE GUIDEPOST OF INDUSTRY

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

this *Durethene* POLYETHYLENE Carton Liner could

REVOLUTIONIZE

Your Packaging Costs!

IT'S NO EXAGGERATION . . . many firms who have until now been forced to use expensive steel drums or pails, and to put up with high freight charges because of excessive package weight, are already reaping amazing dividends in lower costs all along the line—by switching to standard fibre shipping cartons equipped with *Durethene* Polyethylene Film Liners.

Polyethylene Liner Film, made by the most modern processes and to the most rigid specifications in our two large plants, has *high tensile strength* . . is impervious to moisture . . *won't crack, split or tear* . . is *inert* to most chemicals . . holds products safely with *no leaking or sifting.*

Besides costing less, *Durethene*-lined fibre cartons are easier to store before use; easier to handle in shipping and storage after packing. There is no recovery nuisance and expense. There are no filling problems. Corrosion and contamination of products is impossible.

If you are now using a less modern type of liner material, a change to *Durethene* Polyethylene will free you from sticking, tearing or contamination problems.

Make your own check-up on the great savings-potential for *your* products. We'll be glad to supply working samples of *Durethene,* and to work closely (and without obligation) with you, your carton source and a progressive *Durethene* converter in your area, in developing exactly the right package for your needs. Write or phone us today!

DURETHENE FILM LINERS FOR MULTI-WALL BAGS are doing a remarkable job of protecting well-known products against moisture gain or loss, contamination, sifting.

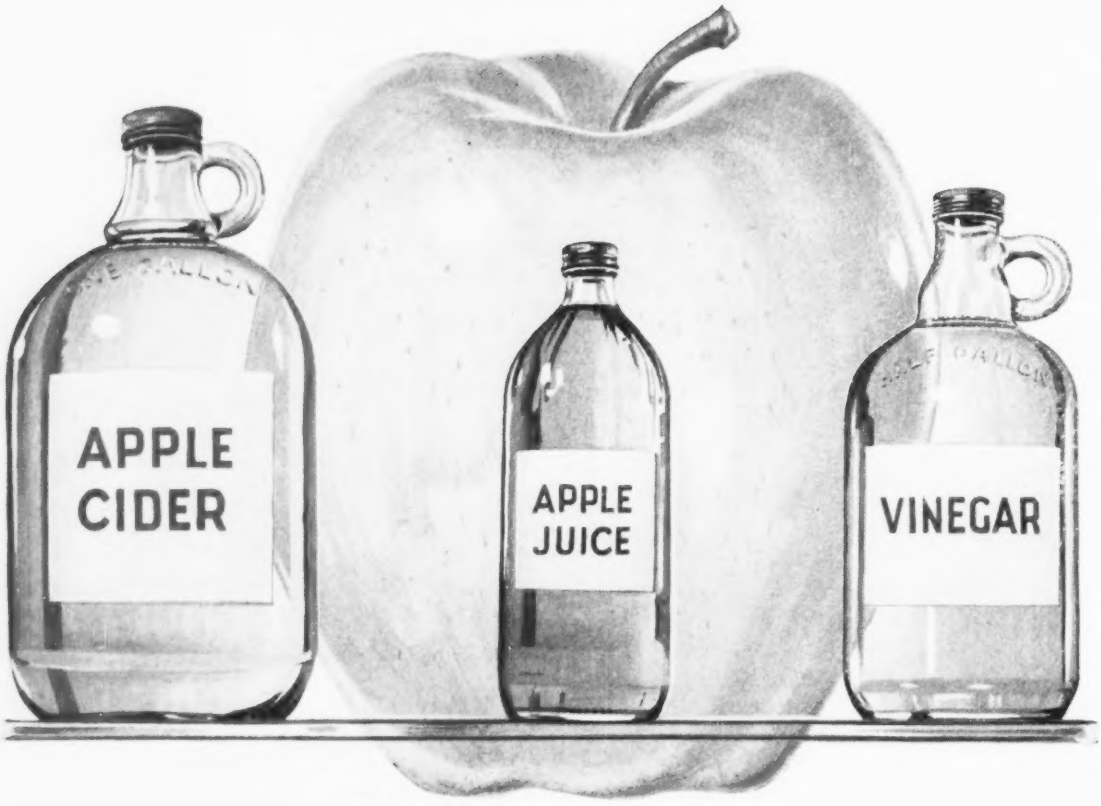
- **DURETHENE Polyethylene Film is also widely used by major packagers everywhere for consumer-packaging such products as *PRODUCE ★ POULTRY ★ FROZEN FOODS ★ POPCORN ★ CANDY ★ SOAP CHEMICALS ★ TEXTILES ★ COSMETICS ★ LEATHER GOODS ★ SPECIALTIES***

Durethene CORPORATION

Manufacturers of Polyethylene Film for Converters

1859 SOUTH 55TH AVENUE, CHICAGO 50, ILLINOIS • OLYMPIC 2-1600
WEST COAST FACTORY: 5600 W. ARBOR VITAE ST., LOS ANGELES 45, CALIF. • OREGON 8-4969

• *Sales Offices in Principal Cities*



How CELITE filtration gives apple products more eye-appeal, longer shelf-life

Celite* Filter Aids enable apple processors to secure brilliantly clear filtrates in their finished products. Celite provides such efficient filtration that it removes most material which promotes fermentation.

The result is a product with longer shelf-life, more eye-appeal—more "buy" appeal. Not only do Celite Filter Aids improve product quality, but they also permit high flow rates with long filtration cycles.

For maximum juice yield from your presses, a small amount of Celite should be used as a pressing aid. Celite Pressing Aids help produce a firm dry cake which can be easily and completely stripped from the cloth.

You are assured of highest product quality with Celite, for it is carefully processed from the purest deposits of diatomaceous earth. Celite is an extremely light weight, highly porous powder. It is chemically inert, insoluble, and specially treated so that it imparts no foreign flavor to fruits or foods.

To speed production and improve product quality, Celite is used in the processing of many foods and beverages such as sugar, fruits and juices, beer and wine. A Celite field engineer will gladly show you how Celite Filter and Pressing Aids can help your product or process. For his services simply write Johns-Manville, Box 60, New York 16, N.Y. In Canada, 199 Bay St., Toronto 1, Ontario.

*Reg. U.S. Pat. Off.

JOHNS-MANVILLE PRODUCTS

Johns-Manville CELITE FILTER AND PRESSING AIDS

For more information, use coupon on page 159.

Gravity feed helps slicer cut faster— TIMKEN® bearings keep it cutting right

THERE are no food clamps, holders or pushers to set or reset on this Globe Model 150 Slicer. Just place the food on the feed chute and slice. In a busy delicatessen, one man with a slicing machine can fill orders almost as fast as he can pick up and put down the food to be sliced.

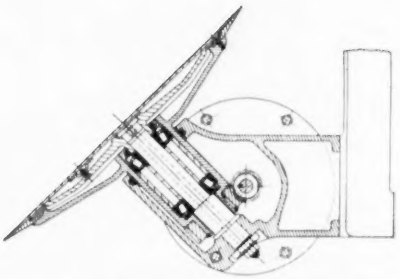
To make sure this machine cuts thin, uniform food slices, the knife shaft is mounted on Timken® bearings.

The tapered construction of Timken bearings prevents end-play in the shaft that holds the blade. Line contact between rollers and races holds the shaft in rigid alignment, prevents wobble. This means the blade cuts uniformly thin, accurate slices every time—even after years of day-in and day-out service.

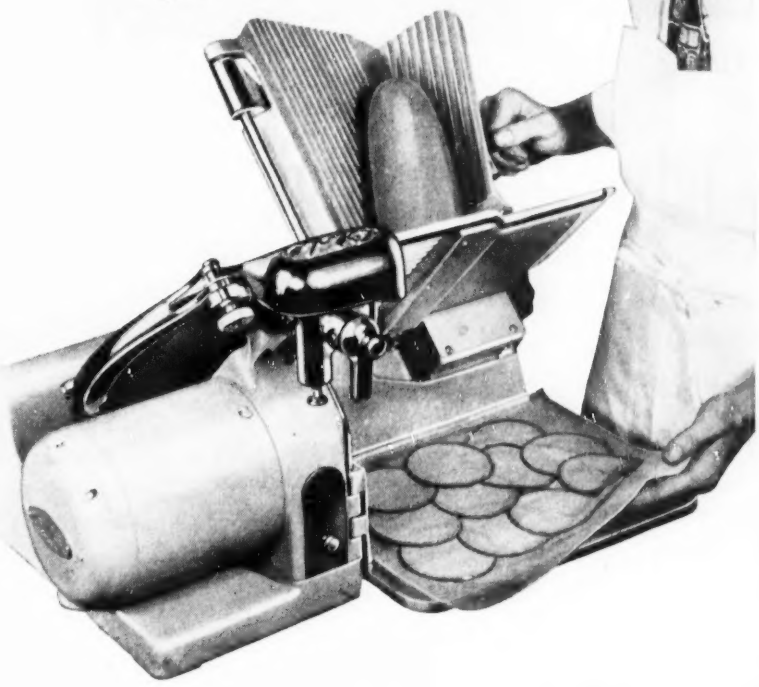
True rolling motion and smooth surface finish practically eliminate friction in the bearings themselves—give Timken bearings amazingly long life. Quiet operation and extreme accuracy are insured.

Made of Timken fine alloy steel, Timken bearings normally last the life of the machine in which they're used. Make sure you specify them in the machines you build or buy. Look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



How **THE GLOBE SLICING MACHINE CO. INC.** mounts the knife shaft of its Model 150 Slicer on Timken tapered roller bearings to assure accurate slicing, long life.

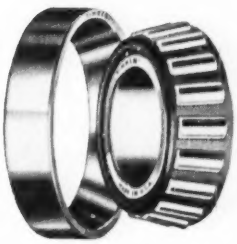


MAGNIFYING GLASS INSPECTION OF EVERY ROLLER!

Every one of the over one billion Timken bearing rollers produced every year is inspected with powerful magnifying glasses to detect surface flaws. It's just one example of how the Timken Company insures uniform high quality.

TIMKEN

TAPERED ROLLER BEARINGS



NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

For more information, use coupon on page 159.

Mason's Root Beer, a leading brand in 5 years, tells

how to package a best-selling flavor

INLAND LINED STEEL CONTAINERS PROTECT THE UNIFORM QUALITY THAT KEEPS MASON'S SALES CLIMBING

Tangy, uniform flavor has made Mason's Root Beer one of the outstanding new successes in the beverage industry. With bottlers, retailers and consumers the country over depending on the uniform quality of their product, Mason's can't afford to take chances on their shipping containers.

Says Jerry Albert, Mason's plant manager: "We use Inland lined containers exclusively in packaging our root beer concentrate because we know we can depend on them to deliver the same high quality we ship. What's more, our losses due to shipping damage are practically nothing—less than ⅓ of 1%!"

Quality control insures that Mason's root beer concentrate never varies more than ½ of 1% in chemical or physical properties. Inland's lining experts worked closely with Mason's chemists to select a lining that could be positively relied on to protect this product from contamination in shipment.

Inland's steel containers with special linings carry a wide variety of food and beverage products to market safely and economically . . . purity and flavor intact. Why not let Inland's lining experts show you how steel packaging may solve your problem? Write for details.

Every pail a traveling salesman

Attractive color lithographing on each container keeps Mason's name constantly on display. Inland lithographs containers up to 65-gal. size in any number of colors. Inland designers, technicians and lithographers provide a completely integrated, low-cost service to put modern sales appeal on your steel package.

INLAND

Inland Steel Container Company

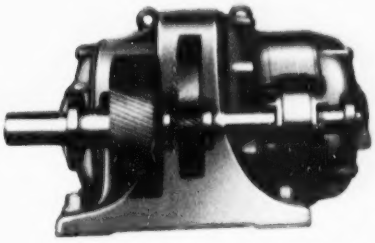
division of **INLAND STEEL COMPANY**

6532 South Menard Avenue • Chicago 38, Illinois

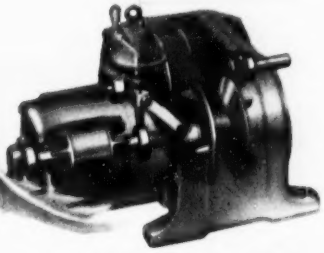
For more information, use coupon on page 159.

POWER

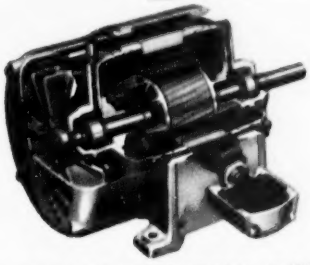
at the top level of dependability



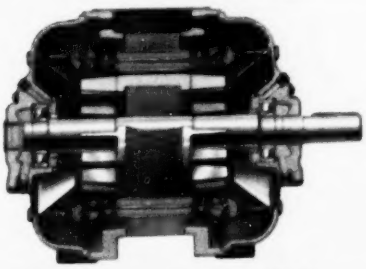
U. S. SYNCROGEAR MOTOR



U. S. VARIDRIVE MOTOR



U. S. TOTALLY-ENCLOSED MOTOR



U. S. UNICLOSED MOTOR

US MOTORS

THEY'VE MADE THEIR WAY BY THE WAY THEY'RE MADE

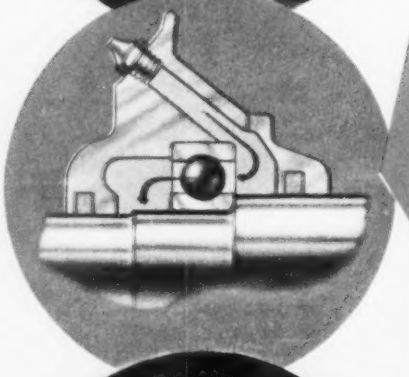
EXTRA FEATURES in U.S. MOTORS increase dependability

If extra long motor life interests you, look into U. S. Motors. Three major features give U. S. Motors years of extra life. (1) All windings are asbestos-protected because asbestos can never carbonize. The windings are forever safe against high temperatures. (2) Lubriflush lubrication insures bearing life far in excess of endurance of conventional types. You get life-time lubrication plus the convenience and durability of re-lubrication. (3) All castings are normalized to maintain accuracy of bearing settings.

Added features include centricast rotor, advanced styling, weatherproof design, highly hardened gears in Syncrogear types, and extra quiet operation. All add up to extreme dependability, unequalled in any other motors.

Extra life without extra cost

ASBESTOS PROTECTION



LUBRIFLUSH BEARINGS

NORMALIZED CASTINGS

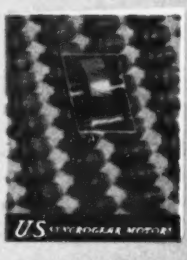
ANY OF THESE INFORMATIVE MOTOR BULLETINS — FREE FOR THE ASKING

UNICLOSED
Most attractive of all motors. Weatherproof. Drip-proof. Streamlined. Capacities to 250 h.p.

VARIDRIVE
Thousands of speeds by simple dial control. 2 to 10,000 r.p.m. Increases output. Quickly repays investment.

ALL U. S. MOTORS
A condensed catalog featuring all types of U. S. Motors in full color. Presents 19 types of motors.

EXPLOSION-PROOF
Totally-enclosed types meeting Underwriters' specifications. Latest improvements for hazardous services.



SYNCROGEAR
Internally-geared motors up to 30 h.p. Pyramidal design. Hardened gears. Sealed protection. 10 to 10,000 r.p.m.

SANITARY
Advanced design meeting all sanitary requirements. Immaculate. Baked white enamel finish. Rustproof.

REQUEST FOR U. S. MOTORS BULLETINS

U. S. Electrical Motors, Inc.
Los Angeles 54, Calif. (Box 2058) or Milford, Conn.

Send U.S. Motors Bulletin as checked below:

☐ Uniclosed	☐ Explosion-proof	☐ Verticlosed
☐ Varidrive	☐ Syncrogear	☐ Unimount Horizontal
☐ All Motors	☐ Sanitary	☐ Autostart Buffers

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE .... STATE .....

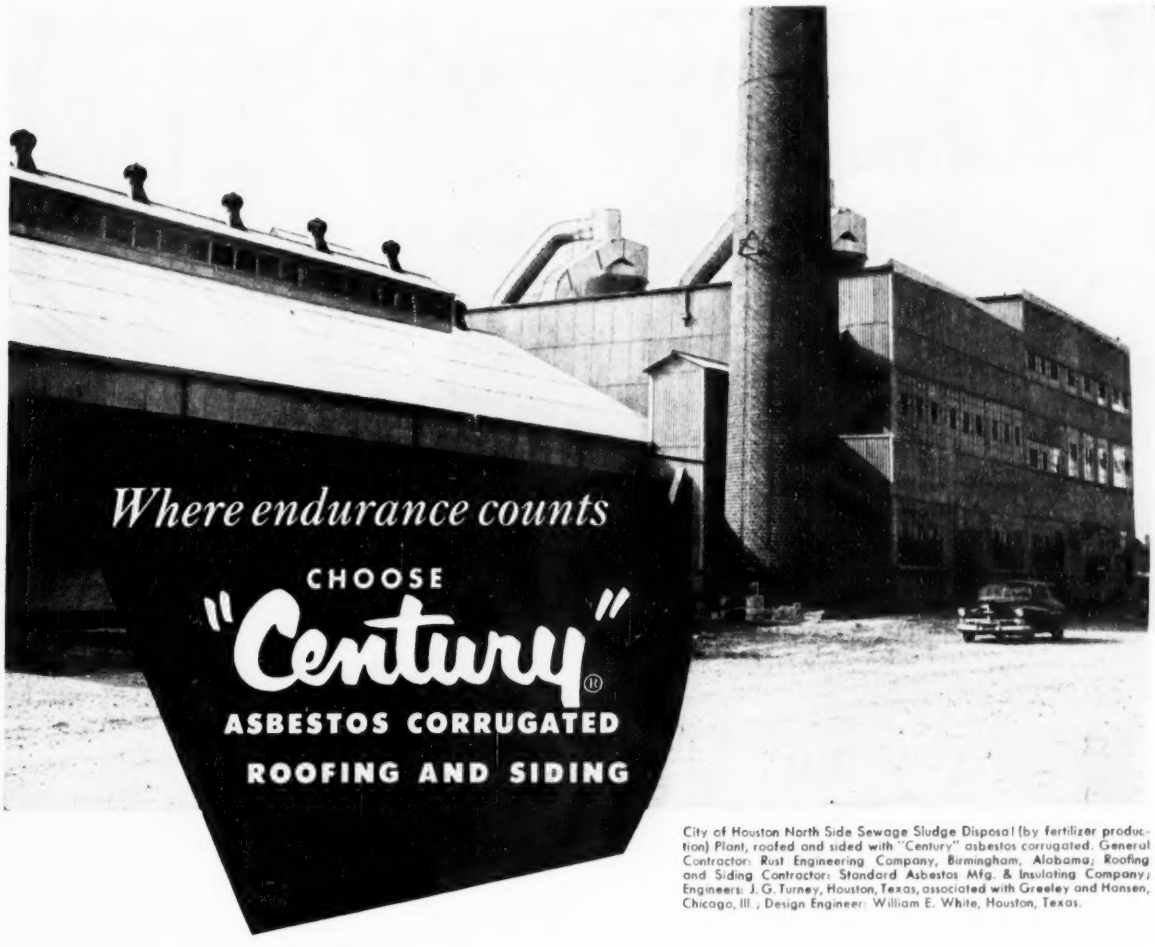
MAIL CONVENIENT COUPON FOR INTERESTING & HELPFUL MOTOR FACTS

Facts you never knew before about motors are presented in U. S. Motors Bulletins. Contain vital information, with illustrations of motors and construction in full color. Mail the coupon.

U.S. MOTORS

U.S. ELECTRICAL MOTORS, INC.

PACIFIC PLANT: Los Angeles 54, Calif. (Box 2058) ATLANTIC PLANT: Milford, Conn.
Sales offices in all principal cities. Consult Phone Directory



City of Houston North Side Sewage Sludge Disposal (by fertilizer production) Plant, roofed and sided with "Century" asbestos corrugated. General Contractor: Rust Engineering Company, Birmingham, Alabama; Roofing and Siding Contractor: Standard Asbestos Mfg. & Insulating Company; Engineers: J. G. Turney, Houston, Texas, associated with Greeley and Hansen, Chicago, Ill.; Design Engineer: William E. White, Houston, Texas.

Long, long, trouble-free service is a feature of "Century" asbestos corrugated that makes it the ideal roofing and siding for many types of structures.

"Century" corrugated is made from asbestos fiber and portland cement, and so combines the advantages of both materials. It is strong, dense and tough. It *cannot* burn, rot, or corrode. It resists weather, vermin, and insects. And—here's an especially well-liked feature—it needs practically no maintenance during its long life, and it *never* needs protective paint. But that's not all!

"Century" asbestos corrugated is made in standard length sheets up to 12 feet that are easy to handle and store, easy to cut and fit, easy to erect. When TOPSIDE* Fasteners are used, no scaffolding is needed within the building, thereby saving additional time and money.

All these outstanding advantages make long-lived "Century" asbestos corrugated sound like a premium-priced building material. Actually it is one of the most economical materials you can specify!—low in application cost, low in maintenance expense.

Before you build, modernize, or expand a plant, get all the details on "Century" asbestos corrugated! We shall gladly send you complete information.

*® H & B Enterprise Corporation

Nature made asbestos . . .
Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

For more information, use coupon on page 159.

PAINLESS CONVERSION

FROM THIS . . .

while plant operated *FULL BLAST!*

It's a fact. Without sacrificing production for a single day, your floors can be converted to long-life, trouble-free Sani-Brick.

No shut-down. No slow-down. No interference. A highly successful installation method* enables Drehmann to lay sparkling new Sani-Brick right over your old worn floors while your plant operates at capacity.

If your present floors are worn, cracked or rotted . . . if sanitary conditions are way down and operating costs way up . . . then it's time for corrective action. Don't throw good money after bad by patching and repairing. Instead, call in a Drehmann engineer and let him tell you how this organization can solve your problem once and for all—and save you money in the bargain.

**So smooth* and efficient is Drehmann's method of installation, this organization is constantly being called upon for conversions by blue ribbon industries.

DREHMANN DESIGNS • ENGINEERS • INSTALLS

HERE ARE NINE IMPORTANT BENEFITS OF THIS COMPREHENSIVE FLOOR SERVICE

- Handsome appearance
- Excellent sanitary properties
- Resistance to acids and alkalies
- Extreme durability
- Faultless drainage
- Easy to clean
- Low cost maintenance
- Freedom from vermin
- Long life

Write our nearest office for Bulletin # A-1 "New Construction and Modernization."

DREHMANN PAVING & FLOORING CO.
ORIGINATORS OF BRICK FLOORS • ESTABLISHED 1869
Gaul and Tioga Sts., Philadelphia 34, Pa.
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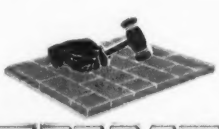
DREHMANN HAS THE FLOOR  FOR MODERN INDUSTRY

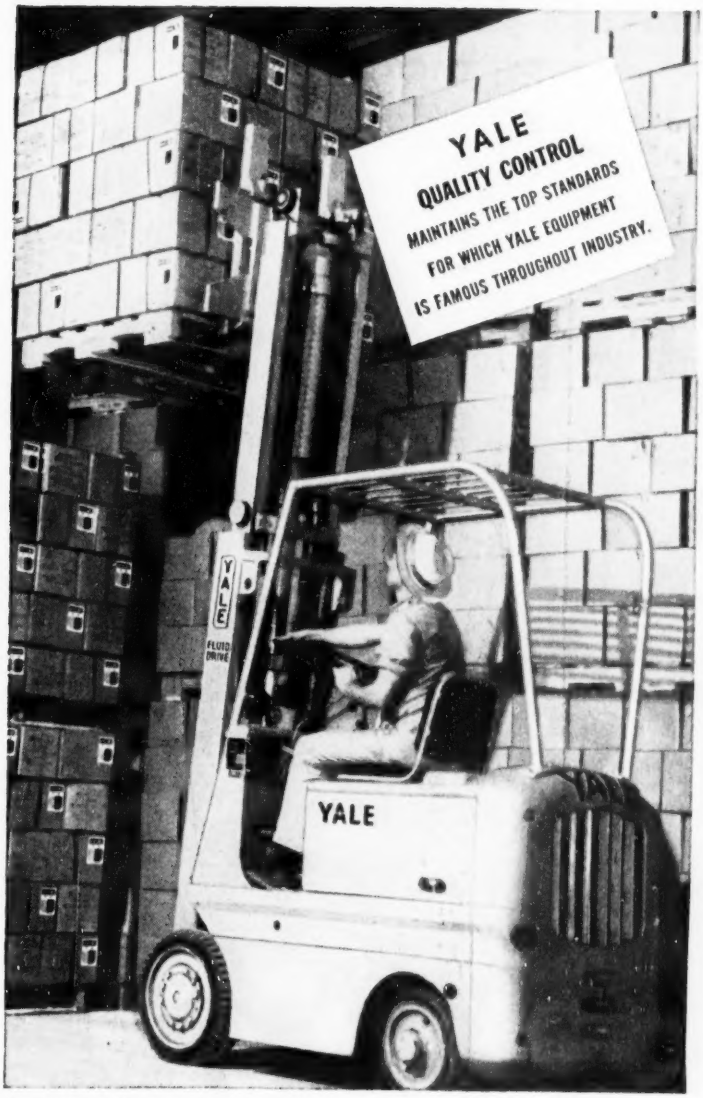
DREHMANN
SANI-BRICK FLOORS

In Industry after Industry

YALE

sets the pace

Give this great YALE truck every test you know. Run it fully loaded on ramps, indoors and out. See the power it delivers... the fuel economy it gives. Let operators test it for smoothness...for maneuverability... for safety...and you'll see why it's the standout truck of this or any other year.



Features no other truck combines

1. Fluid Drive...gives 3 to 8 times longer clutch life
2. 65 HP industrial engine built for rugged continuous service
3. Automotive Type Brakes with extra braking surface
4. Shockless steering...for greater operating ease and safety
5. Hypoid Gears oil-sealed against dirt and dust, give drive 30% more strength against shock loads

*Registered trade mark

A line that meets every materials handling need

Whatever type of truck will serve you best—Gas, Electric or Diesel powered—you'll find it in YALE's comprehensive line.
Also ask for full information on the numerous attachments Yale makes available for special handling problems.

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The Picture Story of Yale Materials Handling Equipment

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Gas, Electric, Diesel Lift Trucks • *Worksavers* • Hand Trucks • Hand and Electric Hoists • Pul-Lifts

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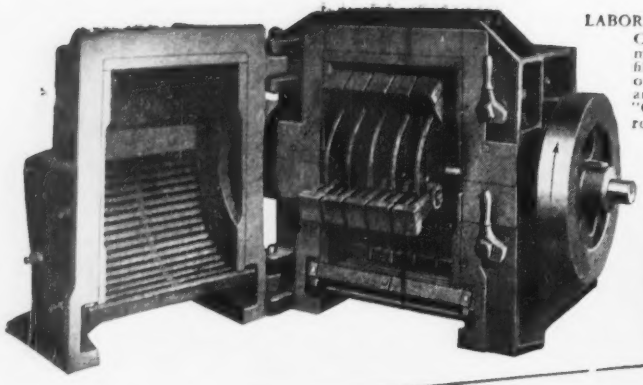
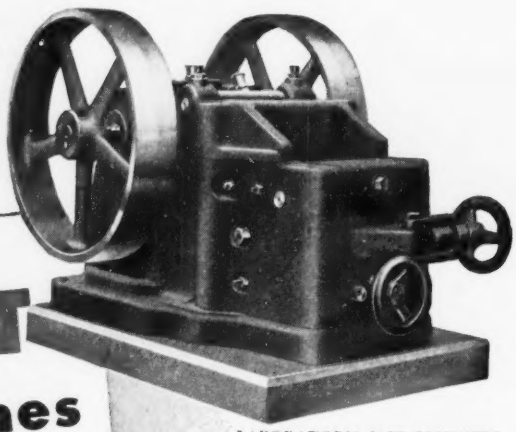


LABORATORY SWING-SLEDGE MILLS

Capable of reducing soft, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning.



STURTEVANT

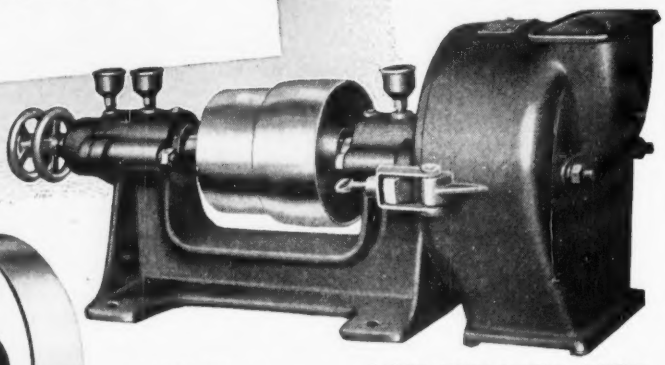
Laboratory Machines

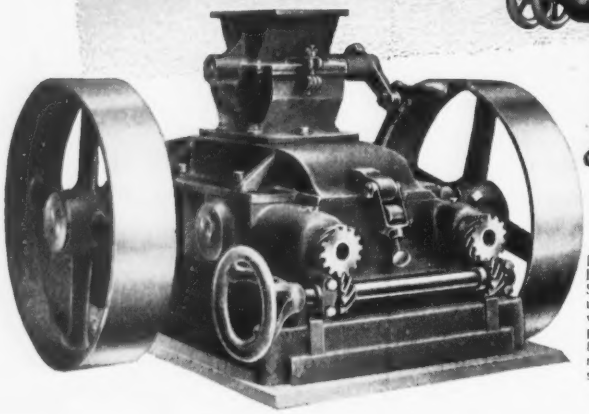
Assure Quality of Products

Fast - Economical - Accurate

LABORATORY JAW CRUSHERS

Special Roll Jaw action simplifies close regulation of the product with capacities varying from 300 or 400 lbs. per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.





LABORATORY CRUSHING ROLLS

First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited outputs. Range of output for the 8 x 5 size is from $\frac{1}{2}$ in. to 20 mesh — and for the 12 x 12 size from $\frac{3}{4}$ in. to 20 mesh.

LABORATORY SAMPLE GRINDER

Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

The only sure way to maintain strict quality of products is laboratory control . . . and that calls for accurate sampling.

Sturtevant Laboratory Equipment meets the exacting requirements of laboratory work. They are fast and accurate . . . provide true samples.

Rugged and dependable, Sturtevant equipment actually has all the features of full size machines plus extra accuracy and wider range of adjustment. The "Open-Door" accessibility permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples.

Investigate Sturtevant equipment for your laboratory. It will cut your sampling costs . . . help maintain strict quality of products . . . increase sales. Write for complete details and catalog.

STURTEVANT MILL COMPANY

106 CLAYTON STREET, BOSTON 22, MASS.

Designers and Manufacturers of:

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

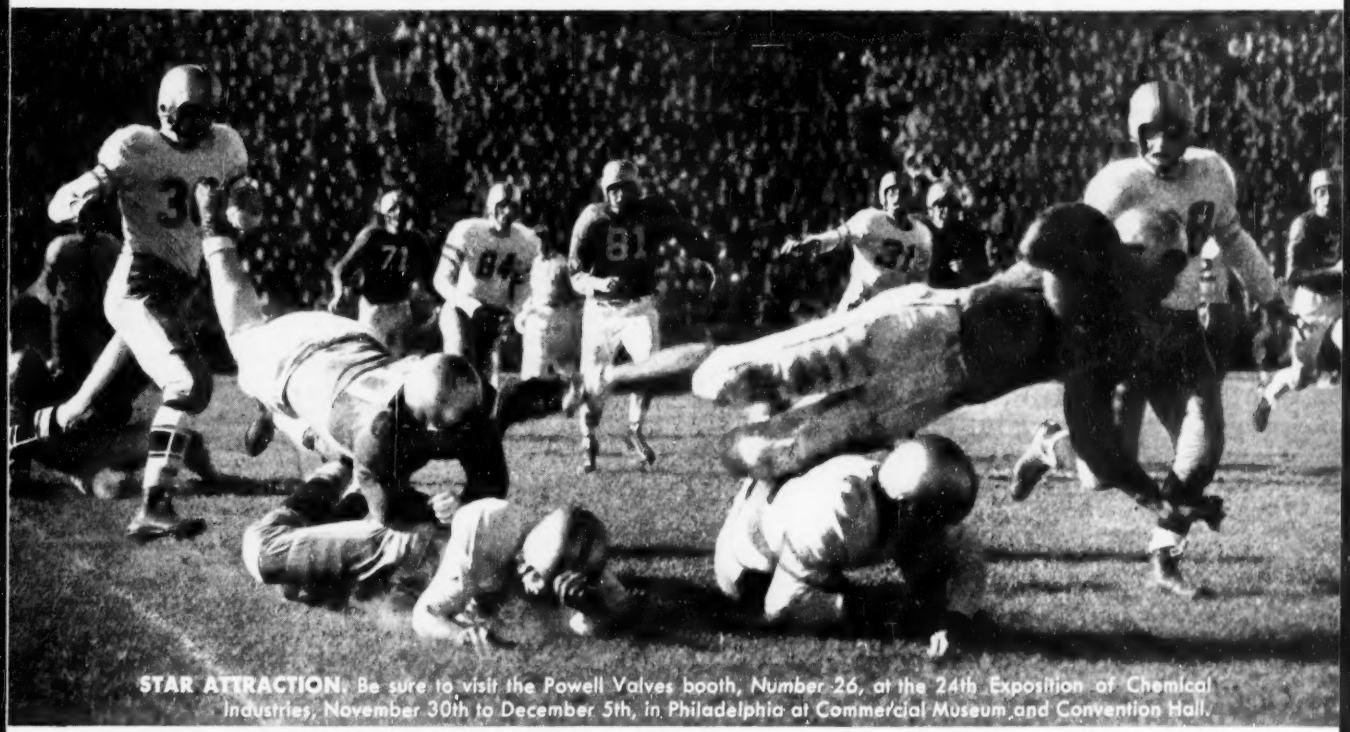
For more information, use coupon on page 159.

STAR PERFORMERS

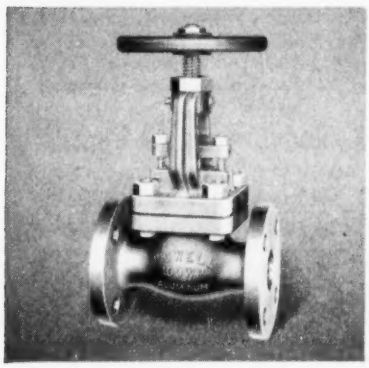
From coast to coast, Powell Valves have won enthusiastic approval. For *every* Powell Valve is a *star for outstanding performance*. They have a record of dependability since 1846.

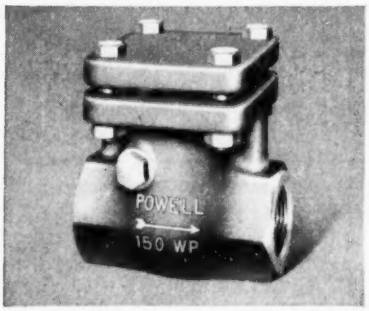
Small wonder that Powell Valves have made such a hit through the years. Powell has probably done more valve research, solved more valve problems and makes more types of valves than any other organization in the world.

We're sure that *you* will be enthusiastic about Powell Valves too once you see how they perform. Following are just a few members of the Powell all-star cast of valves which are available through distributors in principal cities. If a distributor is not located near you, just write us. We'll be pleased to tell you more about these valves—and our complete line.



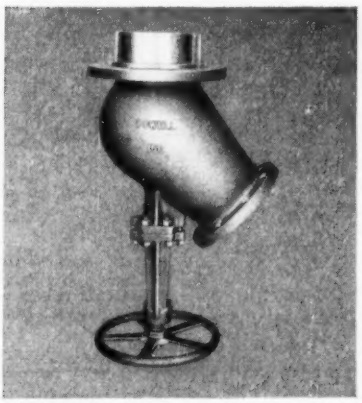
STAR ATTRACTION: Be sure to visit the Powell Valves booth, Number 26, at the 24th Exposition of Chemical Industries, November 30th to December 5th, in Philadelphia at Commercial Museum and Convention Hall.





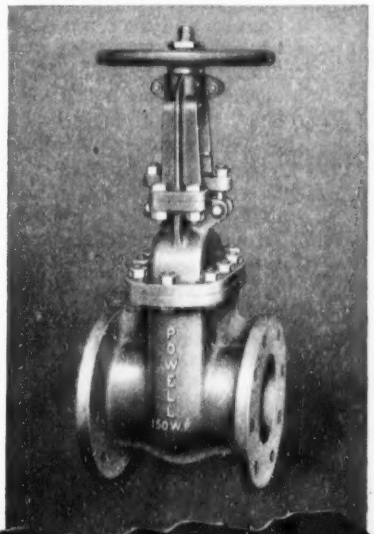
SWING CHECK VALVE *(Fig. 2341)* for 150 pounds W.P. Sturdily built for severe service. Bolted flanged cap. Disc is hung on 5° angle to permit full unobstructed flow. Sizes ¼" to 3", inclusive.

ALUMINUM O.S. & Y. GLOBE VALVE *(Fig. 2445)* for 100 pounds W.P. at 350 F. Stainless steel (18-8) stem, composition disc, integral seat. Stem rises through bronze bushing in upper yoke. Sizes ¼" to 3", inclusive.



FLUSH BOTTOM TANK VALVE *(Fig. 2310)* for 150 pounds W.P. Designed for convenient and fast draining. Disc opens into valve. Also available with disc opening into tank (Fig. 2309).

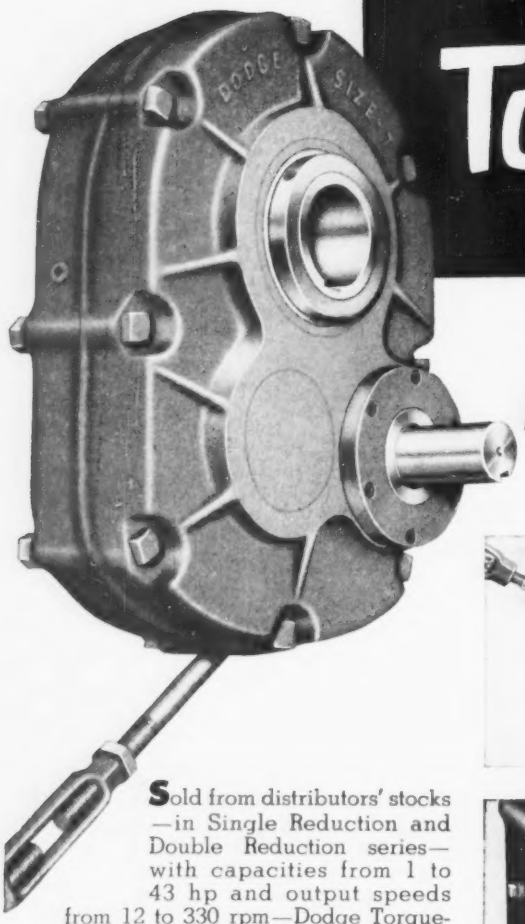
STAINLESS STEEL O.S. & Y. GATE VALVE *(Fig. 2453)* for 150 pounds W.P. at 500 F. Interchangeable solid or double wedges are precision-fitted and accurately guided throughout entire travel. Sizes 5" to 30", inclusive.



Powell Valves

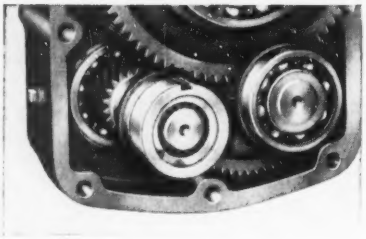
THE WM. POWELL COMPANY

Torque-Arm



The Most Complete Line of Shaft-Mounted Speed Reducers!

TRI-MATIC OVERLOAD RELEASE
Provides instant, positive protection for driven machines, motors and reducer itself. Automatically (1) loosens the belts, (2) cuts off power, (3) gives a warning.



TORQUE-ARM BACK STOP
Available from stock when required. Easily installed—sealed inside reducer housing. Simple, positive action prevents reversal.

Sold from distributors' stocks—in Single Reduction and Double Reduction series—with capacities from 1 to 43 hp and output speeds from 12 to 330 rpm—Dodge Torque-Arm is the new and modern idea in speed reducers.

No special engineering required. No foundation to provide. No flexible couplings. No sliding base. No lining up difficulties. No expensive installation. Stock Taper-Lock sheaves prescribed for each job to provide desired speeds. Application to other machines is practical and easy.

Unit is driven through any V-Belt Drive. Torque-Arm, fastened to any fixed object, anchors the reducer unit. Turnbuckle provides fast and accurate adjustment of belt tension.

Standardize on Torque-Arm, the speed reducer that saves you money.

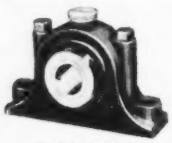
DODGE MANUFACTURING CORPORATION
2800 UNION STREET, MISHAWAKA, INDIANA

DODGE
of Mishawaka, Ind.

CALL *THE TRANSMISSIONEER*, your local Dodge Distributor. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone book.

1878 DODGE 1953 75th ANNIVERSARY

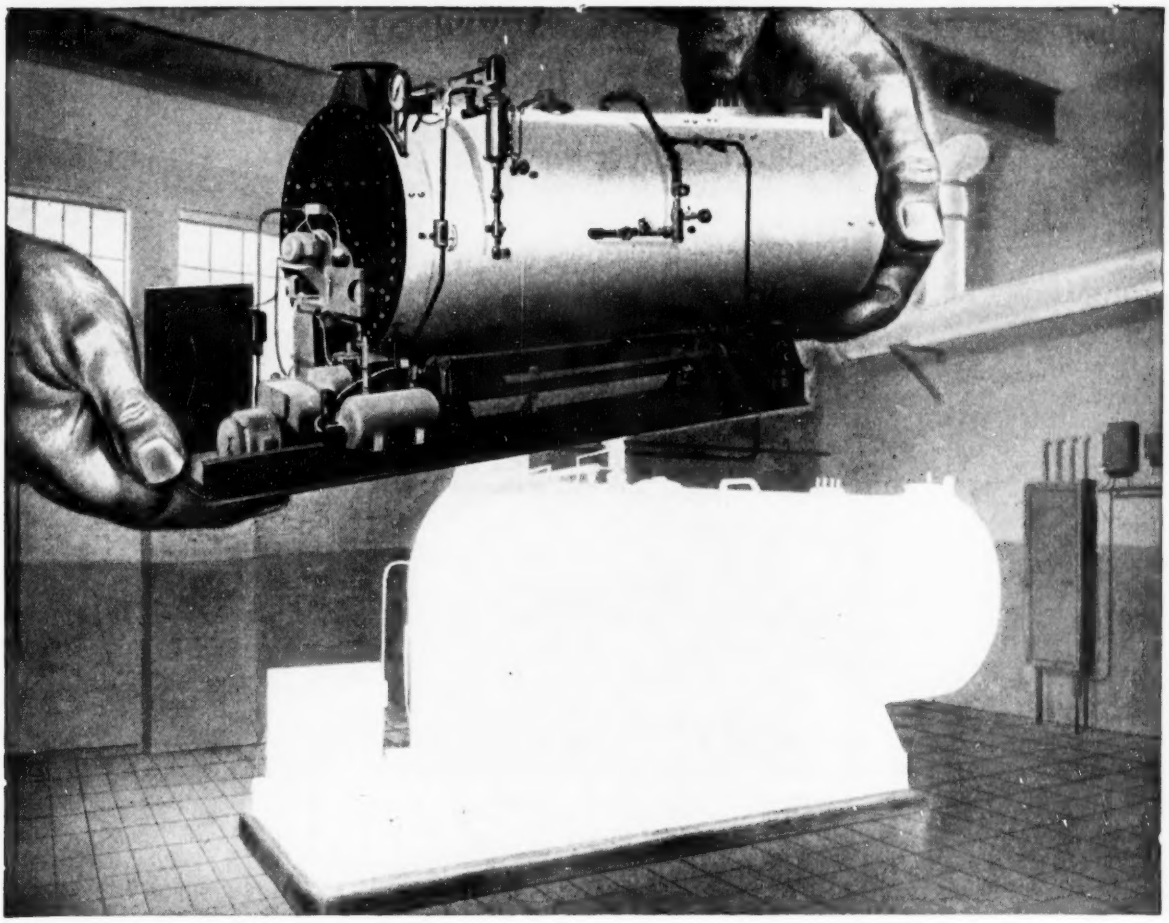
TAPER-LOCK SHEAVES, SEALED LIFE V-BELTS



DODGE-TIMKEN PILLOW BLOCKS

TAPER-LOCK FLEXIBLE COUPLINGS

Here's why you get more...when you buy a Cleaver-Brooks Self-Contained Boiler



...only Cleaver-Brooks can offer you the experience gained from more than 20 years of pioneering . . . and more than 12,000 individual "packaged" boiler installations

CLEAVER-BROOKS pioneering has been largely responsible for simplifying boiler buying . . . lowering costs of installation . . . delivering 80% guaranteed steam efficiency from every fuel dollar.

Boilers can be shipped as completely assembled and tested self-contained units, with auxiliaries as required. Installation involves minimum of time, construction and space. Usually connections only to steam, fuel, water lines and electrical service are needed. No special foundations are required. A short vent takes care of exhaust gases. Frequently, boilers are ready for use in a matter of *hours*, depending on availability of service lines.

Cleaver-Brooks, originators of the self-contained boiler, offers wider experience that counts in another important way. Qualified engineers help you plan steam plants tailored *exactly* for your needs. Carefully analyzed are loads, space and equipment arrangement. This not only helps you solve present steam needs, but adds flexibility for future expansion as well.

This application engineering, plus basically sound design and construction is your assurance of a full return from your boiler investment. When you specify a self-contained boiler — make sure it's a Cleaver-Brooks.

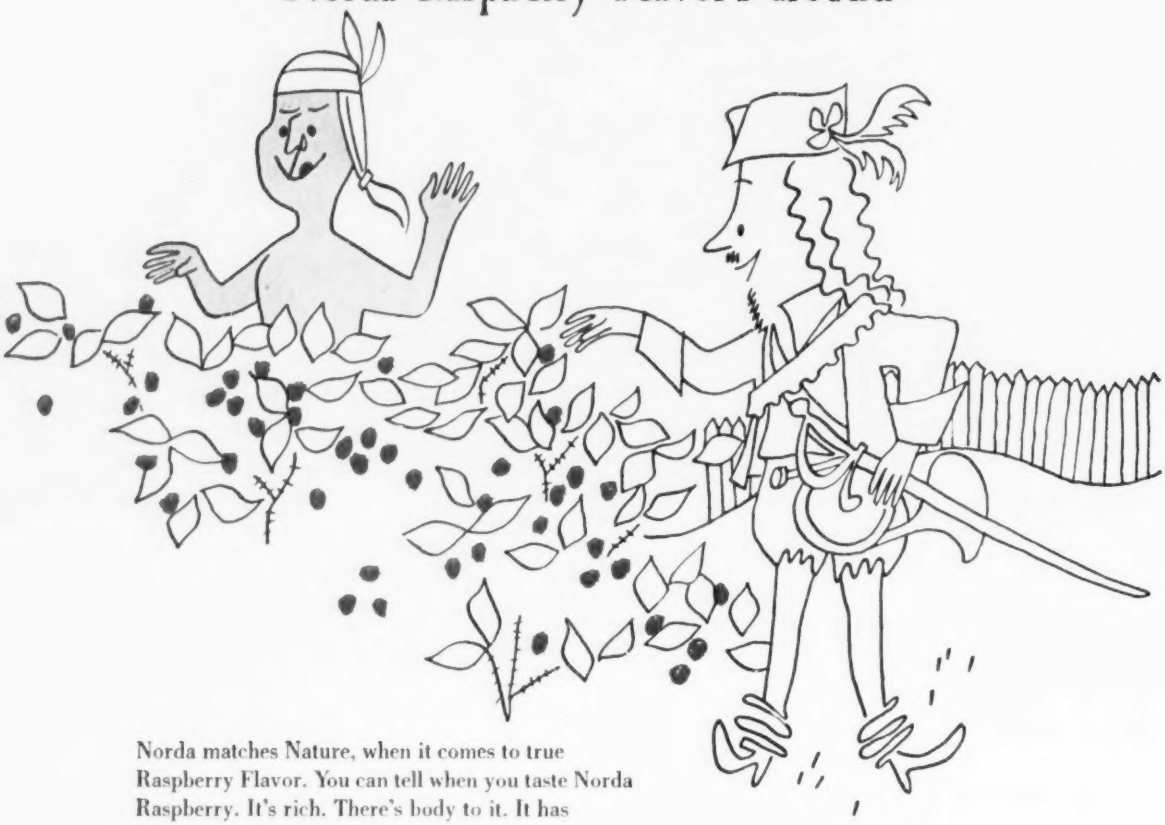
Send for Catalog AD-100 for full details on Cleaver-Brooks boilers. Available for oil, gas and combination oil/gas firing. Sizes 15 to 500 hp, 15 to 250 psi — for heating and processing.

CLEAVER-BROOKS COMPANY
Dept. M 355 E. Keefe Ave.
Milwaukee 12, Wisconsin, U.S.A.

Cleaver-Brooks
ORIGINATORS OF
THE SELF-CONTAINED BOILER
Steam Boilers • Oil and Bitumin Tank
Car Heaters • Distillation Equipment
Oil and Gas Fired Conversion Burners

For more information, use coupon on page 159.

It's said that in 1696,
The Raspberry first was found;
People seem a lot happier now:
Norda Raspberry Flavor's around



Norda matches Nature, when it comes to true Raspberry Flavor. You can tell when you taste Norda Raspberry. It's rich. There's body to it. It has the same real raspberry character that makes the fresh fruit so fine.

Norda makes both genuine natural and imitation red and black raspberry flavors. They have the characteristics of the actual fruit. Their concentrated richness is true-to-life. Their strength saves money for you.

Improve the quality, aroma, tastiness, and popularity of your ices, gelatins, fondants, syrups, and mixes by using Norda Raspberry Flavor. See how much you will improve them by testing and tasting the generous free samples we hope you will send for *today*.

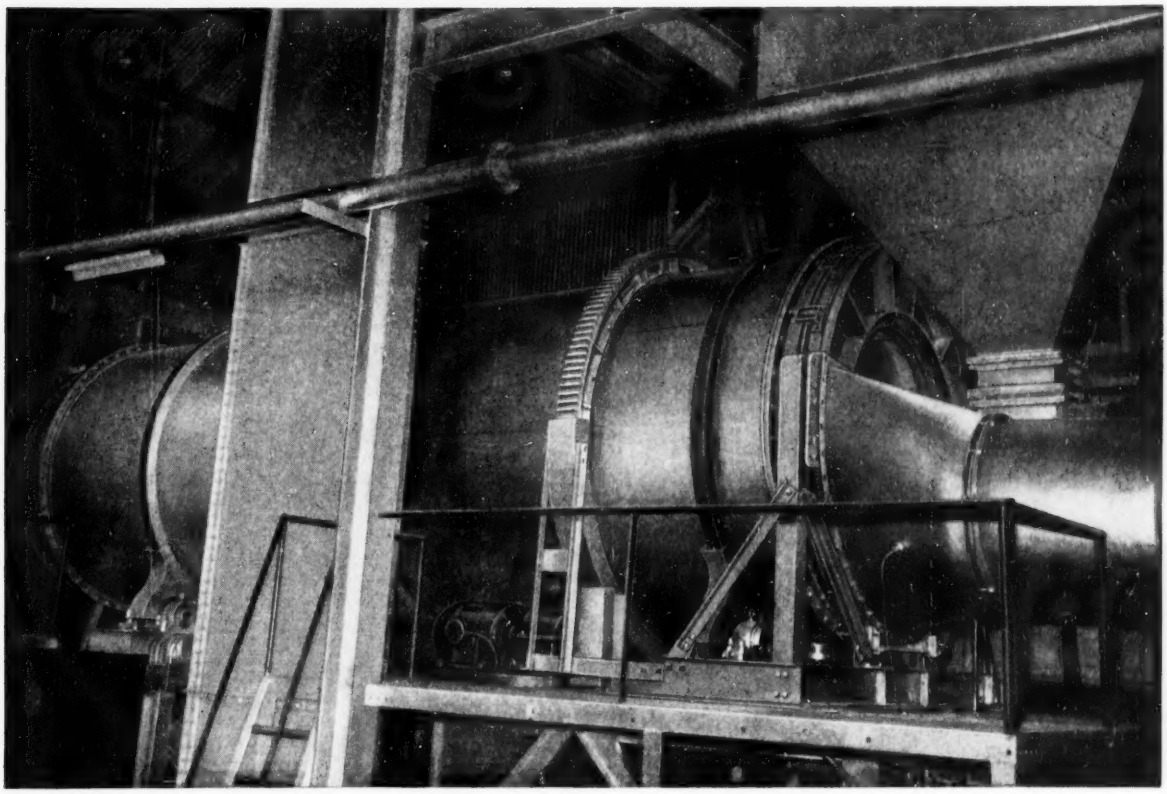
Use "A Favorite to Flavor It"... A Norda Flavor

Norda

ESSENTIAL OIL AND CHEMICAL COMPANY, INC.
601 West 26th Street, New York 1, N. Y.

CHICAGO • LOS ANGELES • SAN FRANCISCO • ST. PAUL • DALLAS • MONTREAL • TORONTO • HAVANA • LONDON • PARIS • GRASSE

Get the correct dryer for your process



Roto-Louvre dryer's gentle drying principle is ideally suited for processing fragile or heat-sensitive materials.

LINK-BELT builds 3 types of dryers ... offers free testing service

WHAT'S your drying problem? Heat sensitive materials? Fine particles? Materials that case-harden? These factors, plus many others, govern the selection of the correct dryer to match your production process. That's why Link-Belt builds three types of dryers—Roto-Louvre, Multi-Louvre and Monotube. And that's why we offer free analysis of your material. Simply send us a sample—a pound or a ton. Utilizing our laboratory facilities, we'll test it . . . work out procedures that can be duplicated in your plant. You'll get an unbiased recommendation for the most economical installation. Get all the facts on this no-obligation service from your Link-Belt office.

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

13.145

LINK-BELT

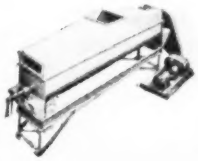
DRYERS • COOLERS • ROASTERS

ROTO-LOUVRE

Drum design provides aerated mass drying. Will not damage heat-sensitive materials. Gradual positive heat transfer prevents case-hardening. Ask for Book 1911-B.

MULTI-LOUVRE

For rapid treatment of large quantities of material. Uniform, constant agitation promotes efficient, uniform drying with minimum degradation. Ask for Book 2409.



MONOTUBE DRYER

For small, inexpensive installations. Excellent for fine-particle materials. Minimizes dusting. Equally effective at high or low temperatures. Ask for Book 2413.

For more information, use coupon on page 159.

Here is the start of a tin can

This sturdy looking rig is part of a Malayan tin dredge. Right here, in the heart of Southeast Asia, many of the cans you're using got their start in life.

Tin has been vital in the preservation of foods since the tin can was invented, over 130 years ago. And from original tin canister to modern tin can, the variety of products packaged in tinplated containers has ranged from foods to prayer books — from fishing worms to Geiger counters. Literally!

Today new developments, such as the Winger Method and the Martin Aseptic Process, are being used to prepare still more canned food products. Whole fluid milk, for example. Carbonated soft drinks. And now frozen foods.

No other material for containers combines all the advantages tin offers the food processing industry. Tin is inert, nontoxic, corrosion resistant. Tin can be electroplated on steel in very thin layers and with few pinholes in the coating. Tin is easily soldered. And the tin can is strong, light, durable—and economical to use.

Over a third of the world's tin is mined and smelted in Malaya. And this famous refined Straits Tin, over 99.87% pure, is world renowned for its absolute reliability of grade. Ask us for any information you may need about Straits Tin.

TIN NEWS, issued monthly, covers noteworthy current developments in the production, marketing and uses of tin. Write for a free copy.

MALAYAN TIN BUREAU

THE MALAYAN TIN BUREAU Dept. 264, 1028 Connecticut Ave., Washington 6, D.C.

Solves leakage problem . . .

● Multi-clean Products, Inc., St. Paul, Minnesota, manufactures industrial floor polishing and scrubbing machines. The machines are shipped with grease already installed in gear reduction units. The problem faced by this company was one of finding a grease that would stand up under hard service and not leak from the gear units. Greases tried either caused or threatened leakage troubles.

Called in on this problem, a Standard Oil lubrication specialist recommended STANOBAR Grease "S", a highly stable grease with a unique adhesive characteristic. Given an accelerated service test, STANOBAR did not leak from the gear unit, and its consistency showed no change that would later cause a leakage problem. There was no wear of gears or bearings. Adopted for use in the units, STANOBAR has solved this company's lubrication problem on every count. Officials have been able to eliminate the costly and troublesome practice of having all units returned to the factory, at 12 months intervals, to be repacked with grease.

STANOBAR
TRADE MARK
Grease

The same lubricating qualities of STANOBAR that solved this problem for Multi-clean Products, Inc. can serve you in a wide variety of applications. A Standard Oil lubrication specialist will be glad to discuss those applications with you. He's right there in your section of the Midwest. You need only phone your local Standard Oil office. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

C. L. Daub is the Standard Oil lubrication specialist who helped Multi-clean Products, Inc. solve an important lubrication problem through his recommendation of STANOBAR Grease.

Like all Standard Oil lubrication specialists, he has a broad background of practical experience plus thorough training in Standard's own schools. And like all lubrication specialists, his on-the-job assistance is always available to the industries in the immediate area he serves. He is one of a corps of experienced men who make their headquarters wherever industry is located throughout the Midwest. Call for the services of your Standard Oil lubrication specialist today. When he stops at your plant, be sure to get information on these outstanding products:

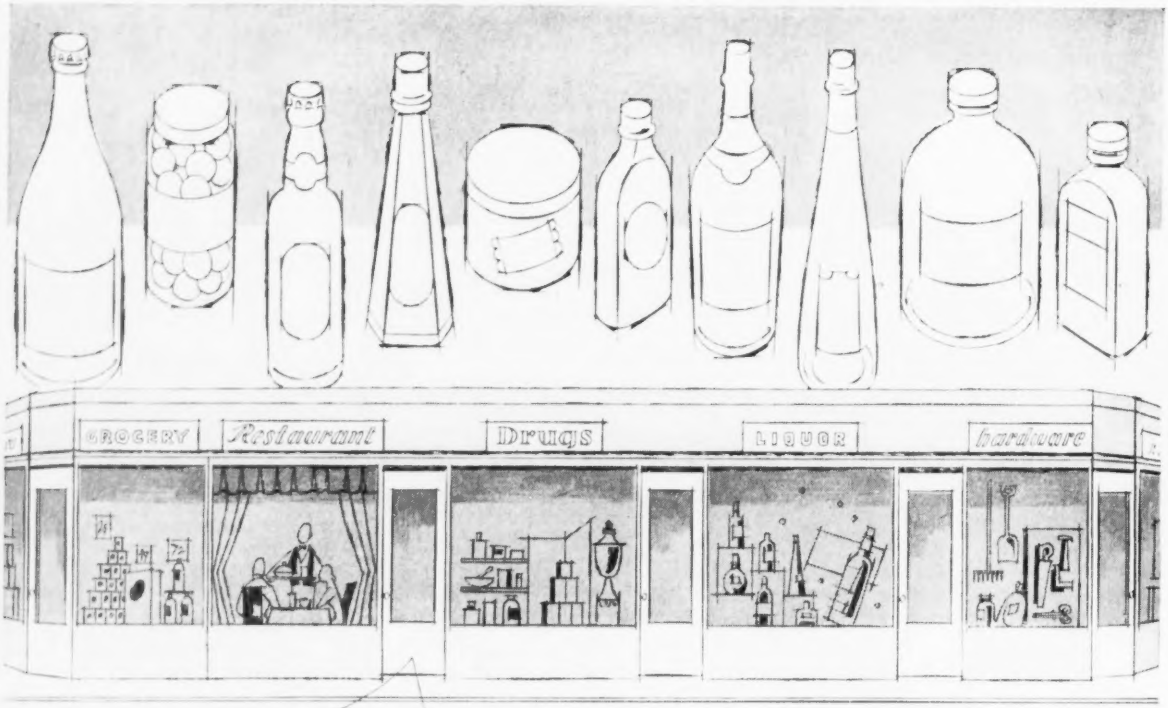
STANOIL Industrial Oils — This multi-purpose line of oils provides cleaner operation of hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One of two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants — On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANORUST Rust Preventives — The eight grades of STANORUST form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically and specially developed for its intended use. The grades range from a fingerprint remover to a heavy semi-solid that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY

STANDARD *(Indiana)*



AT ALL TIMES . . .

your package is your star salesman

The amount spent annually for packaging is variously estimated between 7 and 10 billion dollars. This is, of course, due to the increased recognition, by major executives, that good label and package design, good cartons and shipping cases are essential to the protection of the product until it is in the hands of the final user.

With the steady growth of the chain store and supermarket, your package becomes more and more your star salesman. Here, a messy label, a faulty carton or a broken shipping case can put you at a decided disadvantage with your competition.

Packaging is one of a hundred industries in which Arabol is privileged to serve the leaders. In 68 years, we have developed more than 10,000 adhesives formulas in our five laboratories. Our experience includes adhesives for every type of bottle-labeling machinery, including the most modern. Yet we firmly believe that there is only *one* adhesives formula that can serve you best, in each particular application. Since the amount spent for adhesives can hardly exceed 3% of your total packaging costs, it follows that you can afford adhesives made to your own needs.

We invite the opportunity to submit adhesives samples for you to test in your own plant — under your particular working conditions — for your specific requirements, whatever their nature. That is the one kind of testing that assures you of satisfactory results. Your inquiry to Department 86 will bring a prompt response.

Adhesives? **ARABOL!**

68 Years of Pioneering

THE **ARABOL** MANUFACTURING CO. . . . *a nationwide organization serving major users of industrial adhesives*

EXECUTIVE OFFICES: 110 E. 42nd ST., NEW YORK 17, N.Y. • CHICAGO • SAN FRANCISCO • LOS ANGELES • ST. LOUIS • ATLANTA • PHILADELPHIA • BOSTON • PORTLAND, ORE. • ITASCA, TEX. • LONDON, ENG.

no tubing job is too BIG for TRENTWELD

A famous manufacturer, engaged in atomic energy work, had a problem. Large quantities of stainless steel tubing were required — in sizes larger than regularly manufactured commercially.

Trent solved the problem by producing a 36" O.D. x ¼" wall stainless tube in five to six foot lengths, and then butt welded two sections together to make the ten to twelve-foot lengths required.

Your particular application may not call for extra-size tubing, but no matter what size or shape you require Trent can fill your needs promptly — we produce the largest assortment of tubing sizes in the industry, from ⅛" to 40" O.D.

And when it comes to quality, you just can't buy better tubing than TRENTWELD. That's because TRENTWELD stainless *welded* tubing is a product of tube mill specialists. Each tube has a uniformly sound weld indistinguishable from the parent metal and just as strong and corrosion resistant.

Next time you need stainless or high alloy tubing specify TRENTWELD.

TRENTWELD

STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)

For more information, use coupon on page 159.

TRADE PAPER EDITION
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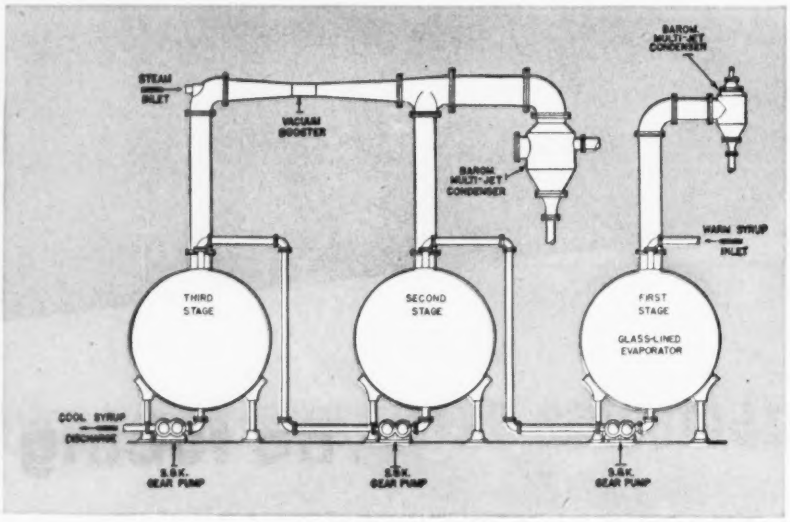
ENGINEERING News

JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT • ROTAMETERS • FLOW INDICATORS • RADIAFIN TUBES • VALVES • SPRAY NOZZLES AND ATOMIZERS • GEAR PUMPS • DESUPERHEATERS

AMERICAN MOLASSES COMPANY USES SK HIGH VACUUM COOLING APPARATUS TO CUT SUGAR SYRUP TEMPERATURE IN HALF

The job of cooling sugar syrups after processing at the Brooklyn, N. Y. plant of the American Molasses Company has been handled since 1940 by the SK High Vacuum Apparatus shown in the diagram.

This apparatus cools 72 Brix sugar syrup at the rate of 50 gpm from 180° F. to 90° F. discharging the syrup at 76 Brix. Cooling is performed in 3 stages as indicated in the diagrammatic arrangement shown here. The first effect operates at 22" Hg. Vacuum; the second effect at 28" Hg.; and the third effect at 29.46" Hg.



Components of the SK High Vacuum Syrup Cooling Apparatus include: Two Barometric Multi-Jet Condensers, a Steam Jet Vacuum Booster, and SK Gear Pumps.

Syrup is pumped, by means of SK Gear Pumps, and is cooled by spraying in successive flash tanks until it is discharged from the third evaporator tank.

Hot syrup is delivered to the first stage evaporator tank. Water, under pressure, is then pumped through the jets of a Barometric Condenser, thus creating a vacuum which "flashes" vapors from the evaporator tank thereby cooling the syrup. The syrup is then pumped to the second stage evaporator tank, where the syrup is further cooled by the same flashing process.

A Steam Jet Vacuum Booster is installed on the third stage evaporator tank to maintain the high vacuum required for final cooling to required temperature.

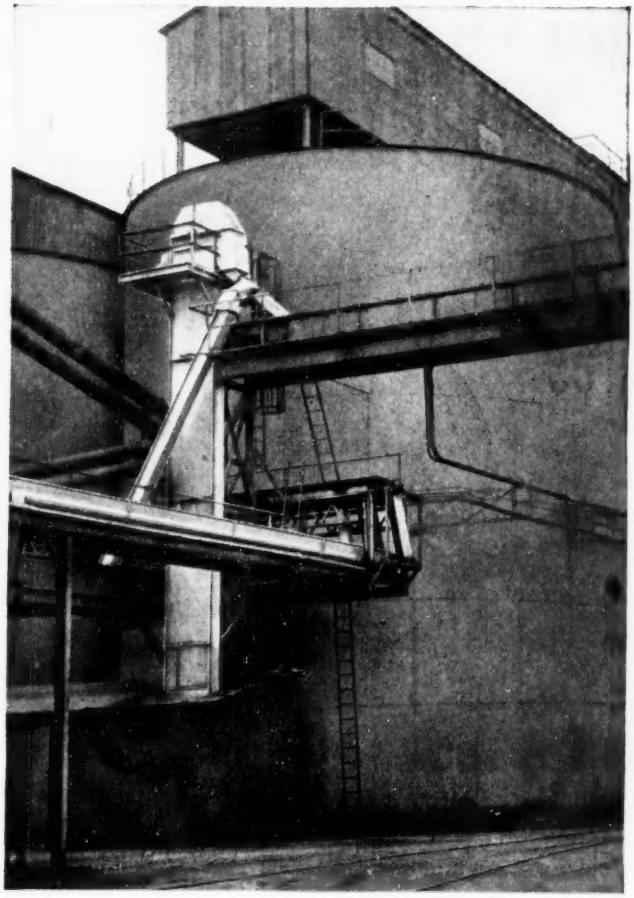
The entrained vapors issue from the venturi of the Vacuum Booster and are delivered to the second stage Barometric Condenser.

The American Molasses Company finds that SK High Vacuum Syrup Cooling Apparatus permits higher filtration rates due to reduced density before cooling; requires no operating labor; is completely sanitary; and requires little maintenance.

For many years SK has been engineering and manufacturing High Vacuum Equipment for the Food Industry. This equipment is being used in connection with processes such as the one illustrated as well as the making of frozen fruit concentrates and others. If you have a requirement for such equipment, contact SK, outlining your requirements, and SK engineers will make equipment recommendations.

SCHUTTE and KOERTING Company
Manufacturing Engineers
25 STATE RD., CORNWELLS HEIGHTS, BUCKS COUNTY, PA
REPRESENTATIVES IN PRINCIPAL CITIES

How to lower the cost of elevating



Let LINK-BELT recommend the bucket elevator that meets your requirements from 13 types in 4 basic designs

WANT to cut your cost of raising materials to processing machinery or to storage bins or silos? Regardless of the capacity required — or the characteristics of your material — there's a Link-Belt Bucket Elevator for the job.

Working with this broad line, Link-Belt engineers can select the one best-suited to your needs. A wide range of sizes on chains or belts is available.

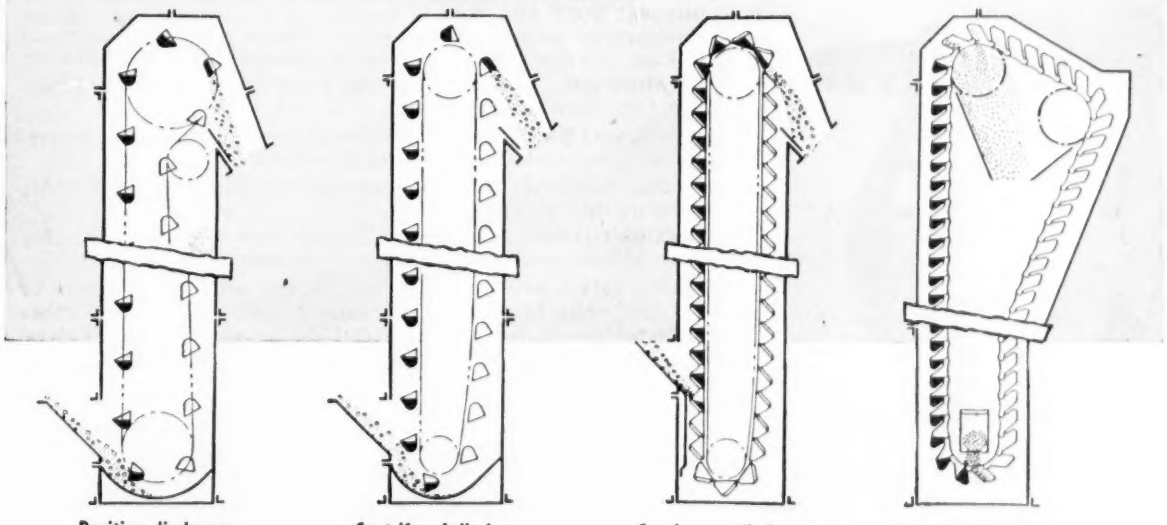
What's more, installation, maintenance and operating costs are low with Link-Belt Bucket Elevators. Rigid, jig-built casings are self-supporting, need only occasional lateral tie-ins depending on height. You have quick access to both head and boot for periodic inspections. Simple screw or gravity take-ups maintain chain or belt tension at all times.

There's an experienced materials handling engineer in the Link-Belt office near you. Call him for complete information.

LINK-BELT

BUCKET ELEVATORS

◀ Midwest soybean oil mill uses several combinations of Link-Belt Bucket Elevators and Screw Conveyors to insure smooth flow of beans throughout process.



Positive discharge
for light, fluffy, fragile or materials that tend to stick to the buckets.

Centrifugal discharge
for free-flowing, fine or loose materials with small to medium lumps.

Continuous discharge
for range of materials —light to heavy, small to large, abrasive lumps.

Internal discharge
for gentle handling of small articles such as pellets, seeds, castings.

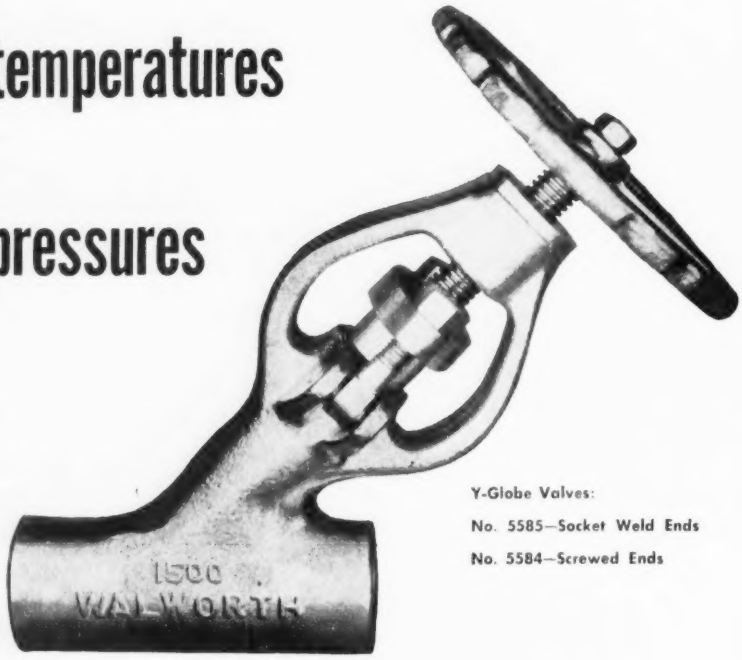
LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 53,258

For more information, use coupon on page 159.

Walworth's NEW small cast steel valves

SERIES 1500 – SIZES ¼ to 2 inches

handle HIGH temperatures
HIGH pressures



Y-Globe Valves:
No. 5585—Socket Weld Ends
No. 5584—Screwed Ends

Walworth is proud to make these new Small Cast Steel Valves available to power stations . . . oil refineries . . . ships . . . wherever piping is subject to severe pressures and temperatures. Non-shock service ratings of these valves: 1500 psi–950F for steam; 3600 psi–100F for water, oil or gas. Cast of chromium molybdenum steel, they are compact and light, yet exceptionally strong. Both Y-Globe and Angle type valves are available.

Simplified Walworth design eliminates many of the valve problems encountered in high pressure service. Among the features of this new valve are:

INTEGRAL BODY AND YOKE – made from a single casting without threading or welding. Bonnet joint — always a potential source of leakage — is eliminated. Valves can be reassembled quickly and easily.

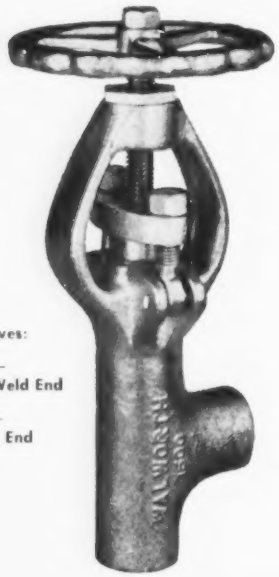
ROTATING DISC – prevents valve seat distortion and consequent leakage. Cuts down replacements.

WELDED SEAT RING – compensates for changes in pressure and temperature—eliminates a major source of leakage.

SPECIAL BACK SEAT BUSHING – permits repacking the valve under pressure with greater safety.

PACKING CHAMBER – designed to dissipate heat thus keeping packing rings at lower temperatures—gives them longer life.

These valves are available with either socket weld ends or screwed ends, in sizes ranging from ¼ to 2 inches. For further information on Walworth series 1500 Small Cast Steel Valves, see your local Walworth distributor, or write for Circular No. 134.



Angle Valves:
No. 5587—
Socket Weld End
No. 5586—
Screwed End

WALWORTH

valves • fittings • pipe wrenches

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imitation vanilla bean flavor by Firmenich

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IN RADIATION "cave" area, technician places envelope containing contaminated plastic near center of tightly packed papers in carton that simulates a box full of packages. To initiate treatment, ray source is raised from below into cage (center). Cans at side received rays in connection with another experiment.

Ray-Sterilizing Food Wrappers

Organisms on heat-and-moisture sensitive papers and films rapidly killed by gamma radiations. Fission byproducts available to deliver them. Packaging materials not injured by the treatment

L. L. KEMPE, J. T. GRAIKOSKI, and L. E. BROWNELL

Department of Bacteriology and Fission Products Laboratory, University of Michigan, Ann Arbor

In unit quantities, paper, plastic, metal laminate, cloth, and other heat-and-moisture sensitive materials used for food containers, can now be sterilized without any significant damage —using gamma ray equipment.

Current interest stems from the fact that substantial waste fission byproducts are being made available for gamma radiation work. And meanwhile the problem of sterilizing packaging materials used in food containers is receiving wider recognition from industrial and public health authorities.

Owen[1] has recently presented data to show that food packages are usually contaminated with microorganisms when ready for filling, although containers for dairy and bakery products have recently improved in this respect. Unlabeled tin and glass containers can be sterilized with steam or hot air. However, such treatment of paper, cardboard, plastics, printed cloth, etc., would usually cause irreparable damage.

The possible large scale use of gamma radiation from fission byproducts suggests an alternative sterilizing technique. Gamma radiation will instantaneously penetrate considerable depths of material and kill microorganisms throughout the mass. Fortunately, this radiation is reported to be essentially harmless to common organic packaging materials at the levels required for sterilization[2, 3, 4]

Commercial adaptation of this process would probably involve establishment of a centrally located sterilizing plant. Here, packaging materials, enclosed in hermetically sealed paper boxes or wrappings, could be sterilized and then shipped to food processing plants for storage in this sterile condition until needed.

It should be pointed out that the cost of irradiation with fission products has not yet been accurately determined, so the economic feasibility of any process based on these materials cannot yet be properly evaluated.[4] On the other hand, there may be specialized instances where the unusual advantages of gamma-ray sterilization will make its use mandatory. For these reasons, it was considered desirable to test the feasibility of using gamma radiation for sterilizing food packaging materials.

Two bacteria, *E. coli* and *B. stearothermophilus NCA 1518* were used in this study. These organisms were selected because they represent approximate minimum and maximum degrees of radio-sensitivity. Also, since it has been shown[5] that yeast and mold spores are killed by radiation doses of approximately the same in-

tensity that are effective against *E. coli*, it was not considered necessary to include yeast and molds in this work.

The spore suspensions were prepared by growing *B. stearothermophilus* on the surface of nutrient agar in Roux flasks at 55 deg. C. for 48 hr. The cells were next harvested by washing from the agar surface with a small amount of sterile distilled water, strained through glass wool to remove agar clumps, centrifuged to recover the cells, suspended in sterile, distilled water, and then boiled for 5 min. to kill the vegetative cells. This spore suspension was stored at 4 deg. C. for future use.

E. coli cultures were grown for 24 hr. at 37 deg. C. in nutrient broth, and then used in this condition.

How Inoculations Were Made

Specimens for irradiation experiments were inoculated by placing either 0.2 ml. of an *E. coli* broth culture or 0.2 ml. of the *B stearothermophilus* spore suspension on a 1 sq. in. section of the test material. The impregnated specimens were next dried at 37 C. for 24 to 48 hr., after which they were placed inside individual, sterile envelopes made from filter paper.

For irradiation, the envelopes containing inoculated specimens were placed near the center of a corrugated-paper box which was tightly packed with paper to simulate a box full of packages. The box was cubical and measured 14 in. on each edge. During irradiation it rested on a stand adjacent to the cobalt-60 gamma-ray "cage," with a 1 in. air space between box face and source. The distance between the cobalt-60 rods and the paper envelopes was thus established at 8 in.

Design and operating details of the cobalt-60 source have been previously described.[6] Briefly, the apparatus consists of 100 cobalt rods in a cylindrical holder, which is raised by remote control into operating position in the radiation "cave" area. When not in use the source is lowered into the storage well below. The 100 cobalt rods have been calculated to contain 9,280 curies.[7]

Dosage rate was determined by placing a "Victoreen" condenser type r-meter in the space inside the card board box. The meter indicated 24,840 roentgens per hr. in this position. After irradiation, the specimens were transferred aseptically to a sterile flask containing 100 ml. of sterile distilled water. The flasks were vibrated at 200 rpm. on a New Brunswick shaker, which develops a 1 in.-dia. circular agitation pattern. Control samples were treated identically, except that they were not irradiated. Decimal dilutions were next made from the sterile flasks into culture media suitable for counting the resulting colonies.

Beef extract-peptone media was used for plating *E. coli*. Incubation was carried out for approximately 30 hr. at 37.5 C. before counts were made. For *B. stearothermophilus*, Bacto-Dextrose Tryptone agar (Difco) was used, and the plates were incubated for 48 hr. at 55 C. before counting. A conventional type Quebec colony counter was employed.

To arrive at dosages to be used for sterilization, the samples were irradiated at various time intervals. Tables I to IV give the results of a series of experiments.

The experimental data from representative experiments shown in the tables demonstrate that packaging materials can be sterilized with gamma radiation from cobalt-60. The dosages required are approximately 10,000 times smaller than those reported to cause damage to plastics,[1,2] cellulose, and cotton fibers.[3]

Suitability Shown

No damage, such as color change, embrittlement, clouding, etc., was observed in any of the samples of plastic, cloth, or paper irradiated in the course of the work.

It was also found practical to sterilize "Lusteroid" plastic centrifuge tubes for routine use in our laboratory. Several successive sterilizations have caused no apparent damage to these tubes.

This study further suggests that large unit quantities of a rather wide variety of packaged organic materials

(*Turn to page 174*)

Dosage Performances on Materials

TABLE I—E. COLI Present on Manila Paper

Sample No.	Total Dosage—Rep.* (in Air)	Number of Organisms on 1 Sq. In. of Paper
Control	0	3.8×10^7
#1 Irradiated	50,000	7.0×10^6
#2 Irradiated	99,000	2.5×10^6
#3 Irradiated	149,000	7.5×10^5
#4 Irradiated	199,000	0
Control	0	1.4×10^7
#1 Irradiated	284,000	0
#2 Irradiated	409,000	0
Control	0	1.5×10^8
#1 Irradiated	522,000	0
#2 Irradiated	684,000	0
#3 Irradiated	994,000	0
#4 Irradiated	1,086,000	0

TABLE II—E. COLI Present on Various Packaging Materials

Material No.	Total Dosage—Rep.* (in Air)	Number of Organisms on 1 Sq. In. of Material: Control	Number of Organisms on 1 Sq. In. of Material: Irradiated
Paraffin Paper	199,000	1.65×10^8	0
Cryovac	199,000	6.0×10^8	0
Polyethylene	199,000	1.65×10^8	0
Cloth	199,000	7.0×10^8	0
Saran	199,000	8.0×10^8	0

* Roentgen equivalent physical

TABLE III—B. STEAROTHERMOPHILUS Present on Manila Paper

Sample No.	Total Dosage—Rep.* (in Air)	Number Organisms on 1 Sq. In. of Paper
Control	0	3.0×10^8
#1 Irradiated	143,000	6.5×10^8
#2 Irradiated	252,000	3.0×10^8
#3 Irradiated	521,000	7.5×10^8
#4 Irradiated	1,950,000	3.0×10^8
Control	0	3.2×10^8
#1 Irradiated	521,000	2.2×10^8
#2 Irradiated	1,200,000	0
#3 Irradiated	1,790,000	0
#4 Irradiated	2,330,000	0

TABLE IV—B. STEAROTHERMOPHILUS Present on Various Packaging Materials

Materials	Total Dosage—Rep.* (in Air)	Number of Organisms on 1 Sq. In. of Material: Control	Number of Organisms on 1 Sq. In. of Material: Irradiated
Paraffin Paper	1,310,000	7.0×10^6	1.7×10^3
Cryovac	1,310,000	9.5×10^6	1.5×10^3
Polyethylene	1,310,000	16.5×10^6	4.75×10^4
Cloth	1,310,000	2.3×10^6	0
Saran	1,310,000	7.5×10^6	0
Paraffin Paper	1,900,000	2.7×10^7	0
Cryovac	1,900,000	3.25×10^6	0
Polyethylene	1,900,000	3.0×10^7	0
Cloth	1,900,000	50,000	0
Paper	1,900,000	20,000	0

* Roentgen equivalent physical

JET-FREEZING
Newest Quick-Freeze System

It requires no special enclosure in present low-temp. storage rooms . . . Economies, performance, and test procedures detailed

JET-FREEZING 200,000 lb. of turkeys a day. This latest method is now in commercial use at Alford Refrigerated Warehouses, Dallas. Author is seen checking flow with velometer. Thermocouple wires, used in test, lead into stack and jet duct installation (seen top).

EDWARD SIMONS
Consulting Engineer, San Francisco

Jet-freezing, a new concept in quick-freeze methods, was originally devised as an economic expedient. It was developed to handle the rapidly increasing poultry production in the Dallas-Ft. Worth, Tex., area. Here, each succeeding season, poultrymen have decried the growing scarcity of quick-freeze facilities. Most of these were located in public refrigerated warehouses.

Warehousemen were in agreement that more quick-freeze capacity was needed. However, because of year-'round demands for their freezer space, they were reluctant to convert any of this into conventional quick-freeze operations solely for the poultry season.

The problem was to find a means, not yet developed, by which existing freezer space could be temporarily converted to an efficient quick-freezing system. The limitations, set by Fred Alford, Alford Refrigerated Warehouses, Dallas, excluded the building of rooms within present freezer space for this purpose. The freezing operation had to be one that could be operated within these rooms without building alterations. This would make possible the alternate use of this space for storage and for freezer operations. And this requirement was the point of departure for the development of the jet-freezing system.

Tests, reported at length herein, and the actual commercial operation of jet-freezing at this plant, have proved the efficiency and economy of the system. With addition of a few more cold diffusers to those already in the freezing room, and four jet-ducts with fans, this operation is jet-freezing 200,000 lb. of turkeys each 24-hr. day. Moreover, the tests and subsequent operation developed the following advantages:

▶ The high position of jet ducts allows off-season freezer-type storage

CALLED world's largest warehouse, Alford's Cadiz St. plant dominates whole area. Buildings are more than 1,700 ft. long and are 250 ft. wide. They contain 15 million cu. ft. of space, including 8,725,000 cu. ft. of refrigerated space.

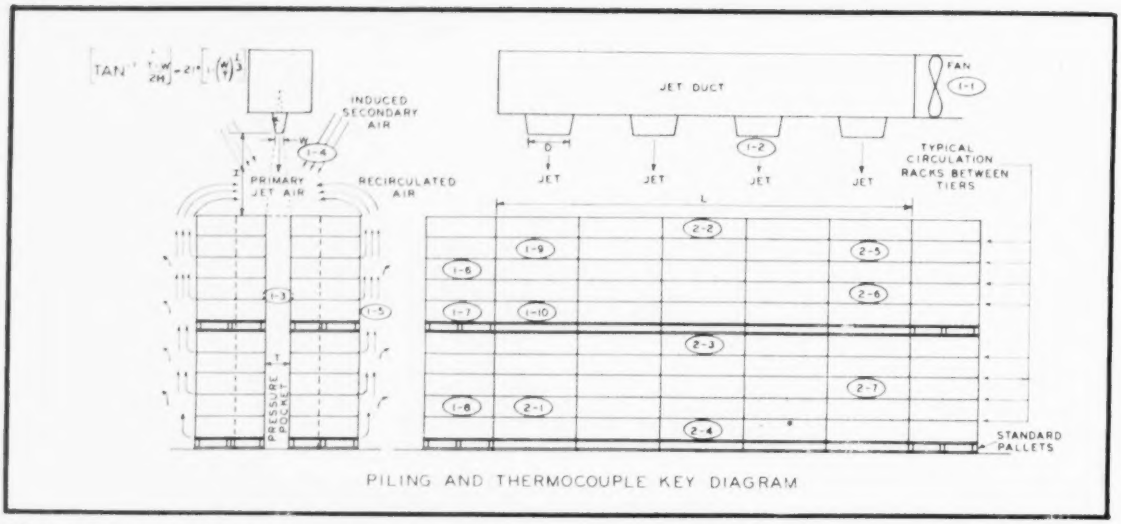


FIG. 1. Piling principles and jet relationships used. Boxed turkeys—5 boxes per pallet, two pallets high—form the pile. Boxes are separated by air-circulation racks. Jet duct is located directly above central chimney. Numbers, in ovals, indicate locations of thermocouples during test.

without interference from the ducts.

▶ Functional piling beneath the jets is done by fork-lift. It incurs no additional piling and positioning costs over ordinary fork-lift operations.

▶ With supporting racks of proper design, and when heat transfer is controlled by the product (as in the case of poultry freezing), a minimum air-flow of 200-240 ft./min. is satisfactory.

▶ The system allows a very flexible piling pattern, with irregularity of height and the inclusion of various products in the same pile as long as proper pressure pockets are developed.

▶ Defrosting operations do not have noticeable effect upon the freezing process as long as the temperature of the mean air-blast is kept about 15 deg. F. below the final freezing temperature required. It is preferable to defrost at the beginning of freezing.

▶ The system may be used for precooling, partial freezing, drying, etc.

▶ Power consumption is very low (as compared with the rates required in air-blast tunnels), which contributes to economy in operation and reduction of refrigeration requirements.

In these tests, the product was eviscerated turkeys in wooden boxes, piled five tiers high per pallet. Each tier of boxes was separated by circulation racks. Turkeys were in individual plastic sealed wrappings. A single interior layer of paper overwrap was folded around the contents of each box. In this functional piling, fork-truck operators used the jet duct and its nozzles as means of alignment in positioning the longitudinal piles. No floor markings or other alignments were required to maintain a pressure pocket width of from 14 in. to 16 in. within excellent limits.

End closure of the pocket was effected with a single two-pallet stack at each end of the pressure pocket. (The use of the single stacks in the test was dictated by the availability of product in the pre-season test.) Double two-pallet stacks are preferable for the end closure. They extend farther across the ends, thus prevent any possible short-circuiting or bypassing of air through the end joints of the piling. The length of the test piling showed a "growth" of 9½ in. over the theoretical snug pallet stacking. The horizontal difference in length between actual piling and the sum of the box widths was available for air flow along the edges of the packages.

Air from the jet duct discharged through the nozzles at a velocity of approximately 4,000 fpm. With a flow of primary jet air of 10,400 cfm, the total air flow through the piling beneath the jet duct was 26,300 cfm. The difference of 15,900 cfm between the total flow and the primary flow was due to the jet-pump action, which induced recirculated and secondary air, forcing it downward into the pressure pocket and outward horizontally through the pack.

In the case of the test, the entrainment ratio was 15,900/10,400, or 1.53. The *entrainment ratio* is defined as the ratio of induced air flow to primary jet air flow. Expressed as a formula, the relationship is—

$$E = \frac{Q_T - Q_J}{Q_J} \qquad (1)$$

where

E is entrainment ratio

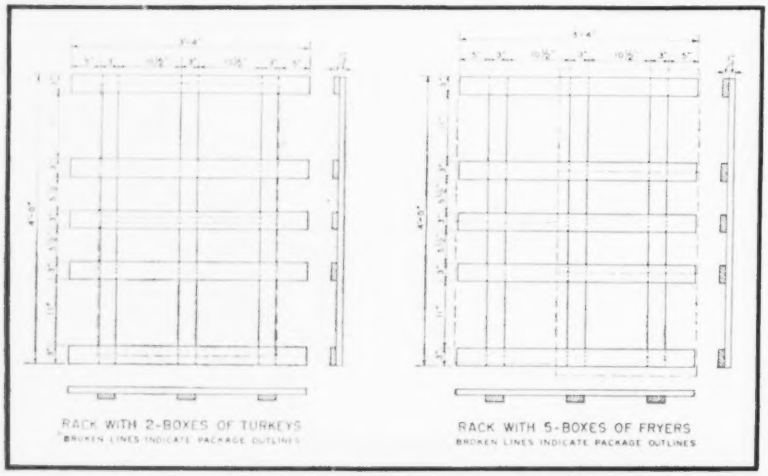

RACK WITH 2-BOXES OF TURKEYS
BROKEN LINES INDICATE PACKAGE OUTLINES
RACK WITH 5-BOXES OF FRYERS
BROKEN LINES INDICATE PACKAGE OUTLINES

FIG. 2. Air-circulation racks, separating boxes of poultry, permit easy air-flow between tiers and allow high heat-transfer rate due to turbulence developed by rack design. Positioning of boxes is shown.

Q_T is total air flow through palletized piles (cfm.)

Q_J is total primary jet air flow through jet nozzles (cfm.)

Design Approach

Study of available literature was principally directed through the use of *Refrigeration Abstracts*.[4] Available trade literature was also studied, and field investigations were made concerning freezing rates developed through various freezing methods. A very important air rate of 250 fpm. over the product had been named by Goree.[5] Tests on freezing rates of 12-lb. packaged stacks of beef have been reported by Ramsbottom, *et al.*[6] These tests showed that the freezing rate is accelerated to a considerable degree by increasing the air velocity from natural circulation to 200 fpm., while little gain is evident for velocities in excess of 500 fpm. A design approach giving a *minimum* velocity through the packages of 200 fpm. appeared sound.

Heat transfer to air from a plane surface is slower than from a surface of variable pattern (tube banks)[7a, 7b] when the areas and temperature driving forces of such surfaces are equivalent. The expansion and contraction action passing over irregular surfaces in confined flow tends to break down the formation of surface insulating air layers. In the calculation of heat transfer conductances across tube banks, the *maximum*[7c] velocity between the tubes is used as the correlating velocity.

Circulation racks were designed to cause expansion and contraction of the air stream. These break the surface insulating films of air which tend to build up across long plane surfaces. This rack design has the effect of moving the heat transfer rate upward toward that which would occur with air flows of 400 fpm. over plane parallel surfaces. The increased turbulence in rack flow combines with the decreased effective length of plane[7d] on the box surface to develop a valuable increase in heat transfer conductance across the air film wiping the surfaces of the boxes.

With air flow conditions thus placed above the requirement for satisfactory minimum operation, the control of the freezing rate and heat transfer passed to the product, and the freezing rate became dependent upon temperature differentials and the ability of the product to release heat in an unsteady-state process of heat transfer involving time, variable temperature, and the heat-valving effect of the thermal diffusivity of the product.[8]

The thermal conductivity of a substance divided by the product of its specific heat and density gives the term "thermal diffusivity". For materials of the same thickness, the cooling time is inversely proportional to the diffusivity, while for materials of the same diffusivity, the cooling time is directly proportional to the square of the thickness.

No information was available concerning the thermal diffusivity of eviscerated turkeys. Data were therefore collected concerning the freezing rates in air-blast tunnels. Design predictions for the jet-pump air-blast freezing system were based upon these data recalculated on a temperature basis of control. Packages were considered as solids having negligible surface resistance while passing through the three stages (1) pre-cooling to freezing, (2) freezing, and (3) sub-cooling after freezing.

The proving tests of the jet-pump

Test Results at a Glance

THERMOCOUPLE	NO. TURKEYS PER BOX	NET WEIGHT ALL TURKEYS, LB	WEIGHT TEST TURKEY, LB
1-6	6	86	14
1-7	6	88	15
1-8	6	86	15
1-9	8	97	11 1/8
1-10	8	97	11 2/8
2-1	5	79	15 1/4
2-2	5	87	17 1/4
2-3	8	97	12 1/8
2-4	8	99	12
2-5	8	73	9 1/4
2-6	8	72	8 1/8
2-7	5	89	16 2/4

FIG. 3. Iron-constantan 'couples were spotted throughout test field. Number combinations identify them. First number: Main lead from selector switch used. Second number: How many 'couples connect to that main lead.

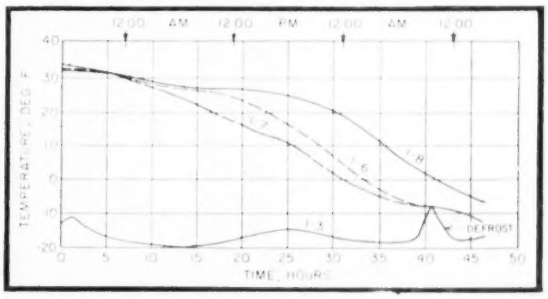


FIG. 4. Faster rates shown by 1-6 and 1-7, when compared to 1-8, are probably due to short-circuiting of higher velocity air, through single-pallet pile at this end of stack. Total weights of these 3 boxes nearly identical.

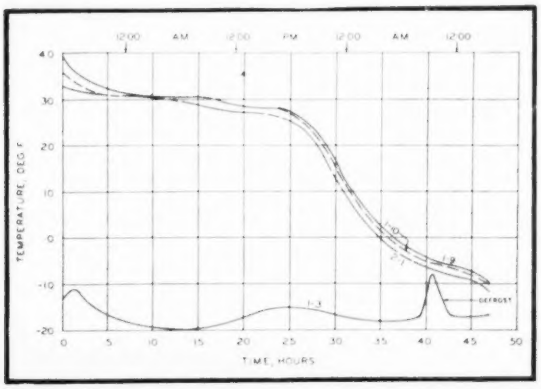


FIG. 5. Although 1-9 and 1-10 were smaller birds than 2-1, they evidence a slower freezing rate. This is a result of mass—total weight—in each of these three boxes.

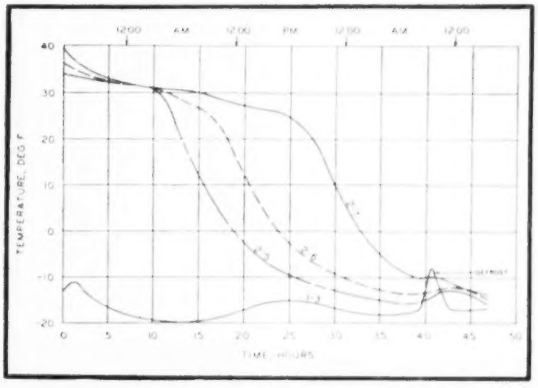


FIG. 6. Rates for 2-5 and 2-6, lightweight birds in light total-weight boxes, are considerably faster than 2-7—a weighty bird in a box having relatively heavy total weight.

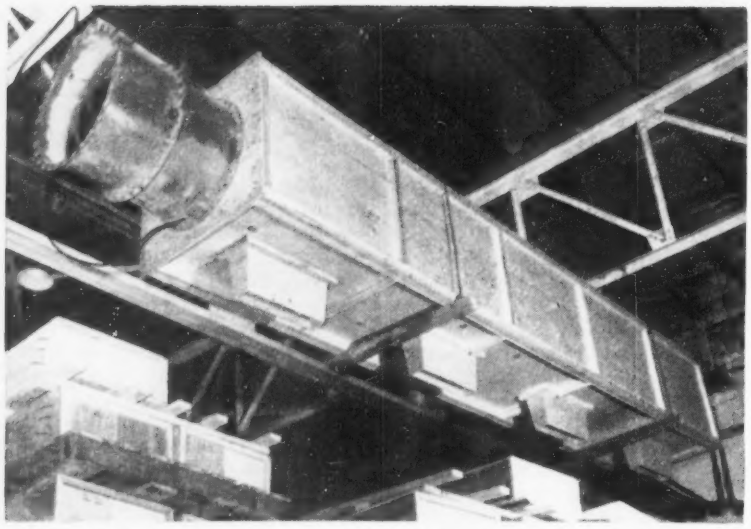


FIG. 7. Jet duct was constructed of 5/16-in. Douglas-fir plywood. Overall exterior dimensions 3 x 3 x 20 ft. Nozzle spacing 5 ft. 4 in., c. to c. Nozzle dimensions (Fig. 1): W 4 in., D 24 in., length 13 in., and nozzle inlet area 7 x 27 in. Fan is 7½-hp. axial-flow type.

air-blast freezing system were run during mid-September of 1952. The room used is 110 ft. wide by 195 ft. long with an area of approximately a half acre. In the original construction, refrigeration was supplied to this freezer holding-room through three clusters of Recold type ceiling blower coils, each cluster comprising twelve 2-ton evaporators arranged in a full-circle ring around each of three main central building columns, above the lower chord of the main trusses.

When the room was converted for quick-freezing, 24 additional evaporator coils were mounted in the truss area along the longitudinal wall at one side of the room. The jet ducts were supported from the trusses, positioned at right angles to the length of the room with the axial-flow fans toward the center coil clusters. The dead ends of the jet ducts faced toward the line of wall-mounted evaporator coils. Fans drew refrigerated air from the centralized evaporator clusters. By entrainment, the jet system drew air from the evaporators along the wall at the dead end of the duct. The refrigerating effect of the evaporator coils was thus delivered to both the primary air of the jets and the secondary air of induction.

In this method of blast freezing, the jet system and the commodity to be frozen may be considered a composite product load. Blower type evaporators are positioned in accordance with the techniques for handling product with this type of air distribution and evaporator arrangement.

The nozzle outlets of the jet were set 13 ft. 10½ in. vertically above the floor of the freezer room. The distance from the jet outlets to the top of the piling was 3 ft. 11 in. The width of the pressure pocket T (Fig. 1) was 14 in. to 16 in.

Each pallet load comprised five tiers, each tier containing two wooden boxes of turkeys 22¾ in. x 32 in. x 8 in. high positioned on the racks.

Thermocouple Locations

Iron-constantan thermocouples were located throughout the test field (Fig. 1). The first identifying number of the thermocouple combination indicates the main lead from the selector switch used. The second number indicates the number of the thermocouple connected to that main lead. Thermocouples 1-6 through 2-7 were inserted at least 2 in. into the breast of the test turkey, under the thigh.

Where freezing is not satisfactorily complete, a "soft spot" shows in the thigh-insulated location; and the cooling curves presented give the temperature-time history in this critical body portion of each test specimen. The number of eviscerated turkeys per box varied (Fig. 3). In each case, the test specimen was selected near the center of the box pack in order that the record might show results effected by the greatest possible insulating value from adjoining product.

Thermocouples 1-1 through 1-5 were placed in the air streams at various critical points. The temperature variations in the pressure pocket were sensed through thermocouple 1-3. Each of the time-temperature charts shows the history of the pressure pocket air temperature developed from thermocouple 1-3. Since the flow of refrigerated air to the pack is from the pressure pocket, the temperature of thermocouple 1-3 is the basic refrigerated air-blast temperature to the product.

Thermocouples were connected into a selector switch within the refrigerated space, and the main leads from the selector switch were taken to the exterior of the room. There they were connected to a potentiometer-type pyrometer in which the standard indicating galvanometer had been replaced by an electronic galvanometer developed for heat transfer

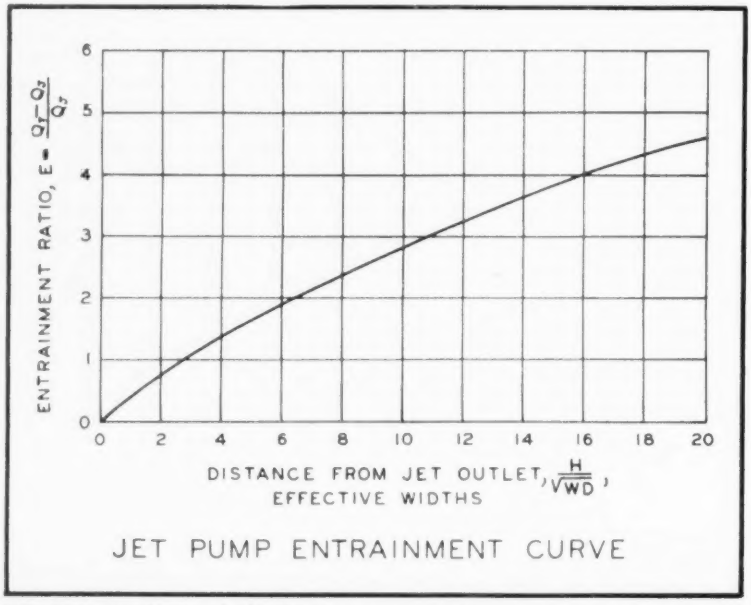


FIG. 8. Curve shows relationship between entrainment ratio and effective jet widths for jet pump action into a stack system used in jet-freezing.

testing. Readings were observed and recorded during the entire test period.

Test readings of the various thermocouples have been plotted into the time-temperature history charts (Figs. 4, 5, 6). The temperatures of the pressure pocket from thermocouple 1-3 are indicated on each of the charts. Results of the temperature tests from the other air-sensing thermocouples have not been placed upon the charts due to the very close temperature positions involved.

At the start of the test, the temperature of thermocouple 1-1 at the fan inlet ran about 4 deg. F. below the temperature of the air leaving the nozzle at thermocouple 1-2, where the temperature was slightly higher than at the fan inlet and slightly lower than the temperature in the pressure pocket—reflecting, of course, the increase in temperature due to the application of the fan energy to the air stream.

At the start of the tests, it was noted that thermocouples 1-4 and 1-5 were sensing about the same air temperature. Throughout the tests these thermocouples were in close temperature agreement, with thermocouple 1-4 sensing induced secondary air and 1-5 sensing air temperature off the pack.

This agreement indicated the possibility of vertical return flow to the jet-pump system. The air currents were then tested and found to be circulating with a vertical flow up the exterior face of the piling.

Over All Surfaces

The actual air-flow pattern therefore provided air circulation over all surfaces of the packages. Thus, in the pressure pocket, the downflow of air encountered the package ends; while the recirculating pattern of vertical air flow induced by the jet pump provided a very efficient wiping action on the exterior ends of the packages. Flow through the pack bathed all horizontal and vertical surfaces parallel to the direction of air flow. Calculations were made by Newman's method[7] for a brick-shaped solid in unsteady state heat transfer. A gain of 5% was indicated in the freezing rate, compared with the condition in which the air flow passed over the upper, lower, and side surfaces only, without definite circulation over the ends.

The exterior of the piling was traversed with a velometer to ascertain the air flow through the piling, and the average velocity leaving the pile channels was 240 fpm., with maximums of 300 fpm. and minimums of 150 fpm.

The evaporator coils in this room were of the water defrost type. A defrost occurred after about 39 hr. of the test run. During the defrost, the temperature rose about 10 deg. F. to −8 deg. F. The defrost does not appear to have a great deal of effect upon the freezing rate as long as the frozen temperature is above 0 deg. F. Since the air temperature is normally considerably below that temperature, the defrost "bump" is not very noticeable. However, where the product was at −10 F., the effect of the defrost was to retard and even reverse the cooling rate (Fig. 6).

It therefore appears desirable to carry air temperatures to the product at least 15 deg. F. below the final freezing temperature desired. Defrosting should be well scheduled with respect to the freezing cycle. The temperature driving force is greatest at the start of cooling, and temperature disturbances of the air blast system are best sustained at that time.

Air Jets and Jet Pumps

When air is discharged from a jet outlet into a free open space, the primary jet air stream becomes a jet pump for moving the air surrounding it. Three principal processes[8] are involved in the pumping action:

1. Acceleration of the particles of the secondary, induced air by impact of its particles with those of the primary jet.

2. Entrainment of the secondary air by viscous friction at the periphery of the primary jet.

3. Over-expansion of the primary jet to pressure below that of the surrounding secondary air to be entrained, with a consequent flow of secondary room air toward the axis of the jet.

The mixing actions of free-expansion jets have been studied and the constant momentum theory has been verified practically. This theory states that the momentum of the moving air stream at all sections is constant. In other words, a certain rate of air discharge from the jet at a very high velocity has a momentum proportional to the product of its weight times velocity. At a remote distance, after air has been entrained, the momentum is still essentially constant for the entire mass of primary air plus entrained secondary air which has been induced.

Where the expansion from a jet is not free, but is restricted by side walls downstream from the jet, the discharge and induction characteristics are entirely changed. As the width of the jet approaches the distance between the side walls, the flow tends to have very low secondary induced air, and the angle of spread of the jet is reduced. With jet discharge into free space, the total included jet angle will run from 10 to 35 deg.

But, where confining walls become more effective, the jet angle decreases until the final air flow lies between parallel boundaries without an included angle when the jet width equals the width between the walls into which it discharges. An estimating approximation of the included angle of the jet has been given by McElroy.[10]

Jet nozzles have side dimensions D and end dimensions W. In the first phase of jet flow, the center line velocity proceeds for four or five jet dimensions before the drag of the entraining air reaches the center core. The air being progressively entrained from the sides drags until it finally applies its effect to the center line velocity which has remained unchanged. The axis velocity remains practically constant as the mixing proceeds from the sides to the axis without affecting the core of the stream.

In the second phase of jet-entrainment flow, the drag or entrainment from the sides continues. It affects the center core velocity, which decreases as the square root of the distance from the orifice, while the air

(*Turn to page 136*)

PRESIDENT Fred Alford of Alford Refrigerated Warehouses. He began new era in refrigerated warehouse operation with the revolutionary design and construction of his huge single-story plant. Jet freezing, developed under his guidance, is hailed as still another important engineering advance.

No-Hold Pasteurization *Makes Progress*

Introduction of units capable of quick heating to 200-300 deg. F. has quickened interest in higher temperatures. But new standards for pasteurization must await intensive laboratory, pilot studies

FRANKLIN W. BARBER

National Dairy Research Laboratories, Inc., Oakdale, N. Y.

To what temperature must a dairy product be heated to produce bacterial destruction equivalent to our present long-hold pasteurization methods?

That question is uppermost in the minds of dairy plant operators and public health officials today. For they are convinced that elimination of holding times offers an opportunity for both quality improvement and economy in plant operations.

But there are knotty problems involved in determining conclusively the lowest temperature that will result in "instantaneous" destruction of the organisms in a given product.

To bring these problems into proper focus, it may be valuable to review the history of HTST pasteurization:

This method has been recognized by the U. S. Health Service (in the Milk Ordinance & Code) as a procedure for milk for a number of years, with a standard of 161 deg. F. for 15 sec. Then in Feb. 1953, the 1950 Edition of the Frozen Dessert Ordinance & Code was amended to include an HTST standard for ice cream mix of 175 deg. F. for 25 sec.

Long-Time Process First

Early investigators were interested in determining the time and temperature necessary to destroy disease-producing organisms which might be present in the raw milk. Perhaps it was the equipment and controls available that necessitated use of low-temperature long-time pasteurization methods. In any case, emphasis of bacteriological research was placed on the time required to kill pathogenic bacteria in the temperature range of 140-150 deg. F. The voluminous results reported, plus the steady decrease of disease outbreaks traceable to milk, show that pasteurization at 143 deg. F. for 30 min. gives satisfactory destruction of the pathogens which might possibly have been present in the raw product.

It was long recognized that rapid heating to high temperatures and holding for short periods might be a more satisfactory method. Therefore, ever since the early 1900's, various HTST or flash pasteurization procedures were investigated. It was not until comparatively recent years, however, that improvements in design of equipment and controls were such that these processes were considered feasible, acceptable, and satisfactory by dairymen and health department officials. As previously mentioned, HTST standards have now been adopted for milk and ice cream mix.

But improvements in equipment and design and knowledge resulting from research on methods of heating are making even newer standards desirable. For example, equipment is now available for heating to temperatures of 200 to 300 deg. F., followed by immediate cooling.

In the investigations on HTST standards for ice cream mix, it was realized that three approaches could be taken:

1. Actual studies on destruction of pathogens added to the mix.
2. Studies on destruction of normal flora of the mix by various heat treatments.
3. Studies using heat-resistant non-pathogenic test organisms.

Much of the early work was concerned with the destruction of *Mycobacterium tuberculosis*. Since this organism is generally considered to be the most resistant of the pathogenic bacteria found in milk, it would appear that the ideal procedure would be to investigate its destruction in milk, cream, ice cream mix, or concentrated milk. But relatively few laboratories are equipped with the proper combination of facilities, equipment, and raw materials necessary to work with pathogens.

Studies on the comparative destruction of the normal bacterial flora might be another approach. However, this flora is variable, and little is known about the organisms present in the product. They may be killed very easily by heat, or they may be more resistant types. Also, the numbers and kinds may vary from day to day.

Use of a test organism of known heat resistance should give the most reliable and satisfactory information. But a suitable organism must meet a number of requirements:

It must survive heat treatment above 175-180 deg. F.; it should be easily recognized by distinctive colony formation on agar plates; it should grow profusely so that large numbers of cells can be harvested for inoculum; it should have uniform heat resistance; and it should be more resistant to heat than the most resistant pathogen and yet have a thermal death-time slope (rate of destruction) as close as possible to that of the pathogen.

Test Organism Isolated

Bacteriologists have investigated many microorganisms in their search for one that would fulfill these requirements, but none was completely satisfactory.

A number of years ago, investigators at National Dairy Research Laboratories isolated an organism from pasteurized milk that was found to meet the requirements for a satisfactory test culture. It survives 180 deg. F. for 15 sec., produces a typical golden yellow colony on yeast extract "N-Z-Amine" agar, grows profusely on this medium at 35 deg. C. (96 deg. F.); has uniform heat resistance when transferred properly; is more resistant to heat than *M. tuberculosis*; and has a thermal death-time curve slope in milk of 11.4 deg. F. as compared with the *M. tuberculosis* thermal death-time curve slope of 12.6 deg. This bacterium, known as Micrococcus M-102, was tentatively identified as *Micrococcus varians*.

Its heat resistance was studied in milk, ice cream mix,

concentrated milk, and chocolate milk. Time to destroy 99.9% was determined in each of these products. The culture was added to milk and ice cream mix in the laboratory, and the numbers surviving pasteurization at 143 deg. F. for 30 min. and 155 deg. for 30 min. were determined.

Used in Ice Cream Mix

Previous studies on ice cream mix pasteurized at different temperatures in commercial equipment had indicated that temperatures between 175 and 180 deg. F. for 25 sec. resulted in destruction of normal flora comparable to that obtained at 160 deg. F. for 30 min. Other studies on an experimental unit disclosed that 175 deg. for 25 sec. or 190 deg. with no holding time (actually 1.4 sec.) was comparable to 155 deg. for 30 min.

With this information as a guide, further studies were made on ice cream mix inoculated with the test organism. These studies were carried out both in the laboratory and in the pilot plant. A range of temperatures was studied from 160-260 deg. F., both with and without a holding time of 25 sec.

These data were carefully summarized, and they are assembled in our accompanying figure, where Curve 1 is the thermal death-time curve of MS-102 in ice cream mix (see Table I for data for this curve). Curve 2 is drawn through the points of 155 deg. F. and 30 min. parallel to Curve 1. Curve 3 is the reported thermal death-time curve for *M. tuberculosis*. Also shown are time and temperature combinations for HTST pasteurization of ice cream mix reported in the literature. These data are summarized in Table II.

Comparing Curves 1 and 3, it is noted that: (a) Rates of destruction of the test culture and *M. tuberculosis* are very nearly the same, and (b) even at temperatures of 200 deg. F. the curves do not cross. This indicates that, even though the curves are not exactly parallel, the pathogenic organism is destroyed more quickly than is the test organism.

It can be concluded, therefore, that data obtained from studies with the test organism can safely be used in the determination of temperatures and time which will result in satisfactory pasteurization. Further examination of the graph discloses that the time and temperature combinations which can be read from Curve 2 will also result in destruction of the pathogen.

Since Curve 2 was drawn parallel to Curve 1, every point on Curve 2 represents a combination of time and temperature resulting in a test-organism destruction which is the same as would be obtained at 155 deg. F. for 30 min. It will be noted that all the points on the graph representing time and temperature combinations for HTST pasteurization of ice cream mix fall well above Curve 2 and hence will result in bacterial destruction which is more than comparable to that which would be obtained by a pasteurization treatment of 155 deg. F. for 30 min.

Further Studies Indicated

Data of this type have been obtained by other laboratories, and the information accumulated did much toward bringing acceptance of HTST pasteurization of ice cream mix and the subsequent standard of 175 deg. F. for 25 sec.

Further studies of a similar nature must be made to determine conclusively the lowest temperatures that will result in "instantaneous" bacterial destruction comparable to that obtained by long-hold or HTST treatments.

These studies are under way at the present time in universities and dairy laboratories. All are working toward the same end—safe, wholesome dairy products through high-temperature no-hold pasteurization.

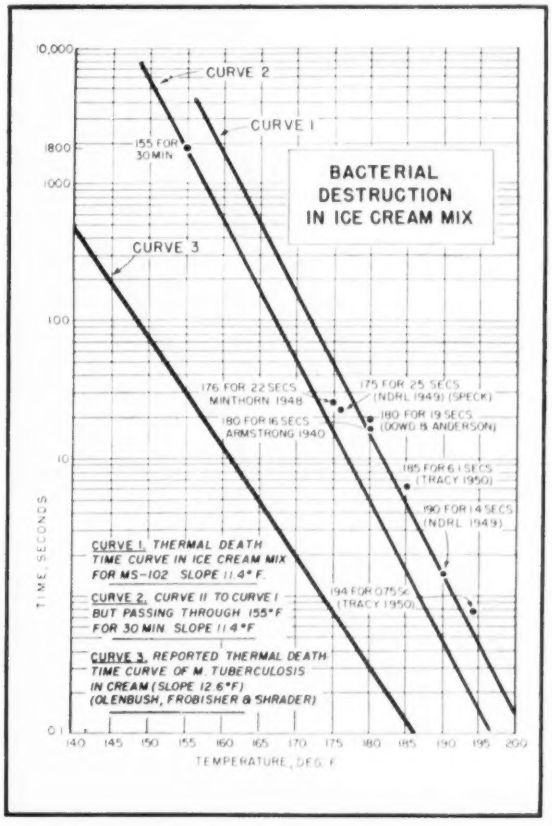
Curves and Tables Point Way To New Standards

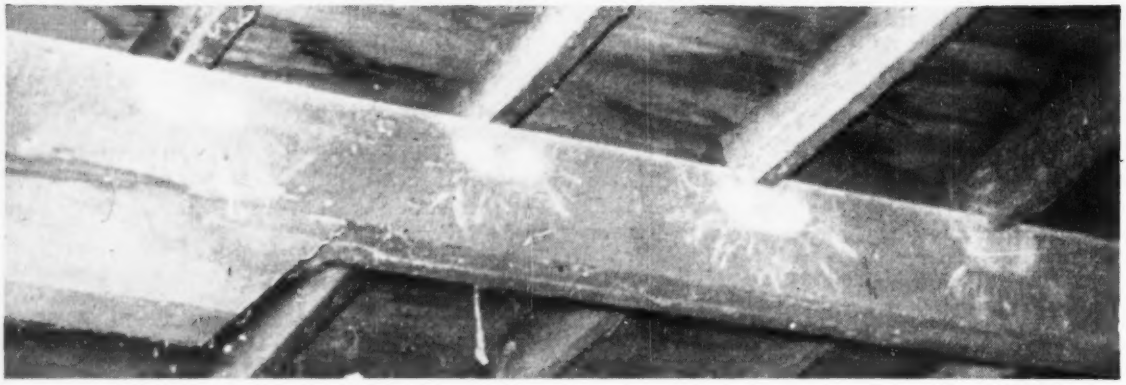
TABLE I—TIME REQUIRED to Obtain 99.9% Destruction of MS-102 in Laboratory Pasteurized Ice Cream Mix

Temperature Deg. F.	Time Sec.	Number of Trials
155	3780	10
160	1650	7
165	642	8
170	210	7
175	48	5
180	9.6-15	5

TABLE II—TIME AND TEMPERATURE COMBINATIONS Reportedly Giving Satisfactory HTST Pasteurization of Ice Cream Mix

Temperature Deg. F.	Time Sec.	Investigator
175	23	Minthorn
175	25	Barber-Hodes
175-180	25	Speck
180	16	Armstrong
180	19	Dowd-Anderson
185	6.1	Tracy *et al.*
190	1.4	Barber-Hodes
194	0.75	Tracy *et al.*





TELL-TALE white marks on beam—snapped by inspector's camera in insanitary plant as photo evidence. They are white-flour smudges made from fur of rats that have swung underneath the cross rafters.

How FDA Men Inspect a Plant

☆ Things they seek ☆ Way they go about it ☆ Possible actions, and what you can do

EDWARD L. HOLMES
Executive Director, American Sanitation Institute, St. Louis

Nearly everyone in the food industry is familiar with the basic requirements of the Federal Food, Drug & Cosmetic Act of 1938. It is a law that has greatly influenced sanitary operation of today's food plants.

However, there is an apparent lack of appreciation of how well FDA has enforced sanitation in a practical way —a misunderstanding giving rise to some unjustified antagonism.

Summarized briefly, the law requires, in part, that any firm manufacturing and shipping food in interstate commerce must do so without its becoming adulterated. A food is adulterated if it consists in whole or in part of a filthy or decomposed substance, or if it has been manufactured, held, or packed under insanitary conditions, whereby it may have been contaminated with filth or rendered injurious to health.

Enforcement inspectors and laboratories throughout the U. S. operate under the FDA, a bureau of the Department of Health, Education & Welfare. The inspectors visit food and drug plants to determine whether or not operations are being conducted that may contaminate finished products. They collect samples and check to see if goods against which action is planned have been shipped in interstate commerce.

Primarily, we are interested in how the food-plant operator is affected by enforcement of the sanitation provisions of this law. The writer, after ten years of experience with FDA and eight years of cooperative work as a food technologist consulting in sanitation problems, believes FDA's basic sanitation program is best indicated by its instructions on how an inspection should be made.

Nature of an Inspection

The following comments are based upon the writer's personal experience:

In the approach to factory check-ups, the inspector is first told to consider each plant individually, based upon his knowledge of the assignment, reputation of the firm, information from files and trade contacts, and consultations with specialists and his supervisors. He must also adapt his inspection to conditions found in the plant.

Second, he is ordinarily told to make a complete inspection during the initial visit and to revisit the plant as the occasion requires.

Third, he is instructed to approach the person in charge of the plant in a dignified, authoritative, and cordial manner and as a responsible official representative of the FDA.

Fourth, he must identify himself to this person, by title, name, and organization, and present his credentials. The purpose of his visit is to be explained—to inspect the plant, to examine the raw materials, to follow through on the manufacturing processes, to check labels and labelings as well as finished products, to determine how finished products are distributed, and possibly to collect investigational samples.

Points of Authority

Recently passed by Congress and signed into federal law by the President is a new amendment that requires a food manufacturer doing business in interstate commerce to permit inspection of his plant. Details of regulations for enforcement of this new section and possible penalties which may be incurred have not as yet been announced. However, there is no reason to believe that general policies of instructions to inspectors will change.

In the writer's opinion, these have always been fair and pertinent. For example, previous instructions to FDA inspectors stated that when, and if, a prosecution is ever brought against a firm or individual for refusal to permit inspection, it will be up to the inspector to prove that his conduct was reasonable and fair and that he exercised every reasonable precaution. Discredit will be reflected upon an inspector's record in the event of a refusal. He is always instructed to discuss his inspection with the person involved—acquainting him on a help-

ful plane, with his obligation under the law, both to the government and society.

Sanitation Inspection

We could discuss at great length various factors involved in making a plant inspection. However, we are mainly concerned with the problems of a sanitation inspection.

Basically, the FDA considers every plant an individual problem, and no set rules apply to any situation. Therefore, the inspector is instructed to use his ingenuity, keeping in mind that a sanitary inspection must be based on common sense rather than impractical fastidiousness.

Filth includes anything nasty or repulsive to a consumer. However, the burden is on the inspector to show that the conditions he notes may defile the finished product or may be dangerous to health.

He is told that contamination with fecal matter is of primary importance, but that an inspector may also review any other type of contamination.

He is instructed to pilot the path of contamination from source to product. Such is often termed an "avenue of contamination."

He is told to evaluate each insanitary practice and to show its possible effect upon the product and also to sum up the total effect. He is also instructed never to over-evaluate any one objectionable practice. Wherever possible, he should illustrate with photos any insanitary conditions.

Basically, the FDA believes that the major factors contributing to filth and poor sanitation in the food plant are, in order of importance:

1. **Human behavior that involves lack of proper personal hygiene, improper attire, and inadequate supervision.**
2. **Rats, mice, and other vermin.**
3. **Flies, roaches, water bugs, and other insects.**
4. **Dirty equipment and utensils.**
5. **Raw materials, water, and ice supplies in an improper condition.**
6. **Insanitary toilets and washing facilities—also their accessibility.**
7. **General plant structure, including surroundings, plant construction in relation to rodents and insect exclusion, general cleanliness, and cleanability.**
8. **Waste disposal, dealing principally with methods of sewage disposal from the plant and other buildings in immediate surroundings, wherever this is of significance.**
9. **Storing and handling—in particular—of such products within the plant that are subject to insect and rodent infestation.**

In studying these factors as they apply to the individual plant, the inspector is told to look for evidence of rat runs and breeding places, rodent or insect excreta, live insects, and other filth on the premises which may disclose the presence of living, breeding rodents and insects.

Inspectors are particularly told to examine storage containers and to report if infestation took place before or during storage. Wherever appropriate and possible, photos and diagrams are to be submitted with reports, to illustrate specific findings.

Let us discuss the major factors relating to a food plant's sanitation:

Human behavior is most significant. After all, sanitation is truly proper behavior of people—a way of life. If employees have proper respect—for handling food products, and for the plant—insanitary conditions will not be found.

Often, there is much attention to food-handling practices in establishments such as restaurants and plants producing food by hand. This focus on hand practice may frequently becloud the significance of human behavior in machine operations, where it is equally important. Here, lack of knowledge, neglect, and indifference lead to conditions fostering infestation by vermin and direct contamination with demonstrable filth.

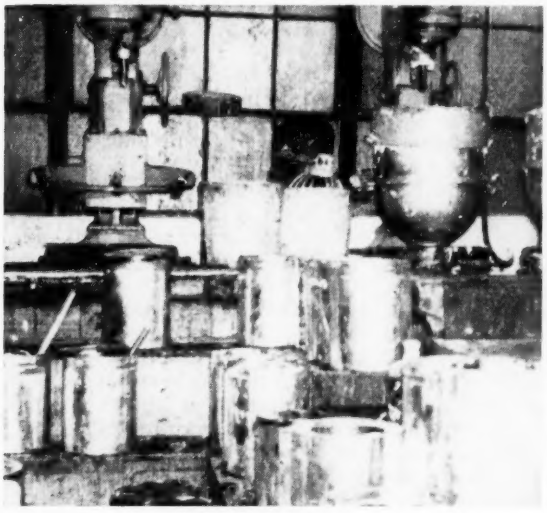
Infestation from rats and other vermin is also considered of prime importance by the FDA, because they are notorious spreaders of disease and filth. The inspector is, therefore, instructed to hunt for such signs of rodents as fresh excreta and gnawings, rat runs on pipes, copings, damaged merchandise, and the like. It is worthy of note that each rat excretes 50 to 75 pellets daily. Specimen pellets must sometimes be examined for disease organisms.

It is emphasized, in the inspector's instructions, that he must endeavor to show (where such is the case) actual rat and mouse contact with the product being prepared in the food-processing plant.

Index of Filth

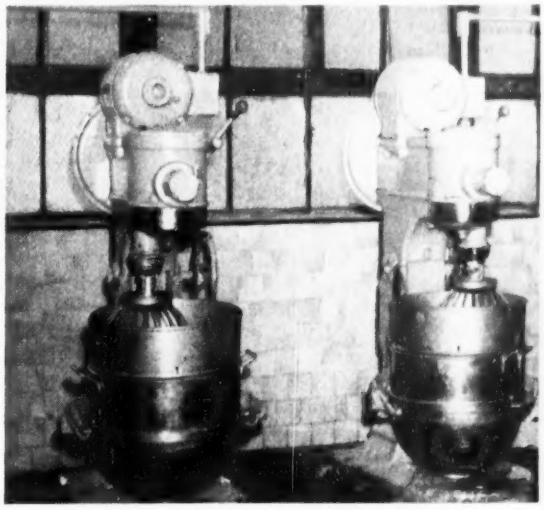
Rodent hairs in a product are primarily considered as an index of filth. And this evidence must be supported by the inspector's observation of possible contact of filth with food material within the plant.

The inspector is instructed to include in his report the name and address of the plant's exterminator,



INSPECTED . . .

Gross-clutter insanitation that led to prosecution.



. . . AND CLEANED UP

Same room remedied by stringent clean-up.

if such is employed. He must also describe the extermination methods. If not properly conducted, some methods may be dangerous.

For example, use of the rodenticide, "1080", in anything other than a locked bait box under restricted conditions, has been described by regulatory administration officials as "a highly questionable practice" which "in our opinion may be a practice which is in violation of the law." The old habit of placing this virulent poison (in liquid solution) in open cups throughout a plant may not be considered a violation of the law. It can be contended that this practice "may render the product injurious to health."

The inspector is told to look for efforts toward rat-proofing and to make a report of the efficacy of these attempts. He is to obtain samples of gnawed products and specimens of rat filth, if any are found.

Insect infestations must be recognized by inspectors. Flies come from maggots and as a rule they do not travel far from breeding places. Maggots primarily feed on bacteria and yeasts in decomposing animal and vegetable matter. Therefore, when finding flies in a plant, a search of the premises usually discloses the offending material. Such material always has an important bearing on any regulatory action against a firm or its products.

Presence of roaches, water bugs, and the like are also to be reported. These insects are considered significant indications of careless sanitation practices. Every effort must be made to find evidence of an avenue of contamination to the finish product, with submission of debris from such infestations.

4-Point Summary

In summarizing, the inspector is first told to secure physical data evidencing filth. Second, he must show avenues of filth transmission to the products. Third, he must discuss in his report the type and trade names of those products in the plant most likely to be contaminated. And fourth, he must report specific shipments of lots that are suspected of being contaminated.

Filth exhibits, consisting of specimens of rodents, insect, or other types of filth found in a plant, must be submitted along with the inspector's report. Wherever possible, photos are to be taken depicting filthy products and situations actually encountered. Such exhibits are invaluable as evidence in any actions taken against a company and its products. They are specifically identified, when obtained, so that the inspector can testify to their authenticity.

Where an inspector collects samples and takes pictures in the course of an inspection, the writer would urge that the manager or owner of the food plant learn why. Then he should immediately correct the condition and emphasize this correction to the inspector.

Information to be gained from FDA inspections. We often hear complaints from food manufacturers (and the writer is speaking here as a food consultant who has been out of the FDA for about ten years) that the FDA inspector does not tell everything that he should. There are reasons, of course, for his not being overly communicative, as a manufacturer might like him to be. However, this complaint needs answering to the best interest of the food industry.

In the past, the inspector has been told to refrain from manifesting an attitude which is so unresponsive that he might be accused of being unfair and not helpful. On the other hand, he is also instructed to avoid any reply to questions that might likely occasion debate and result in the accusation that he is arbitrary or bureaucratic.

For example, he is told never to provide manufacturers with a critical review of labeling when asked to do so. The point here is that the law confers no authority for approval of labels by the FDA. Nevertheless, it has been the policy of this administration to criticize or comment on submited label statements. But it feels that this should be done only by an officer in Washington, and the FDA's field force generally has not been authorized to make such commentaries. In some instances, the district office, but certainly not a field inspector, will make comments.

However, inspectors are told to adopt a different course, in general, in dealing with possible adulterations that they might find in any food plant. Such adulterations may arise from using unfit ingredients or preparing material or finished products under insanitary conditions.

Every effort is made to assign to such work those inspectors with adequate training and ability to appraise the situation accurately. When such an inspector has observed the packing of products of doubtful wholesomeness, *he is told to state so frankly to a responsible member of the firm (whether or not he is asked to do so) that the products of this firm, in his opinion, may violate the law.*

If the packer denies it, the inspector is then instructed not to engage in any argument at that time. He must simply point out that he merely wishes to call the management's attention to specific practices that may make the firm's products illegal.

Moreover, in the inspection of establishments found operating under insanitary conditions, the inspector is formally instructed that at the completion of the inspection he must outline in detail to the manufacturer the various objectionable features which his inspection has disclosed.

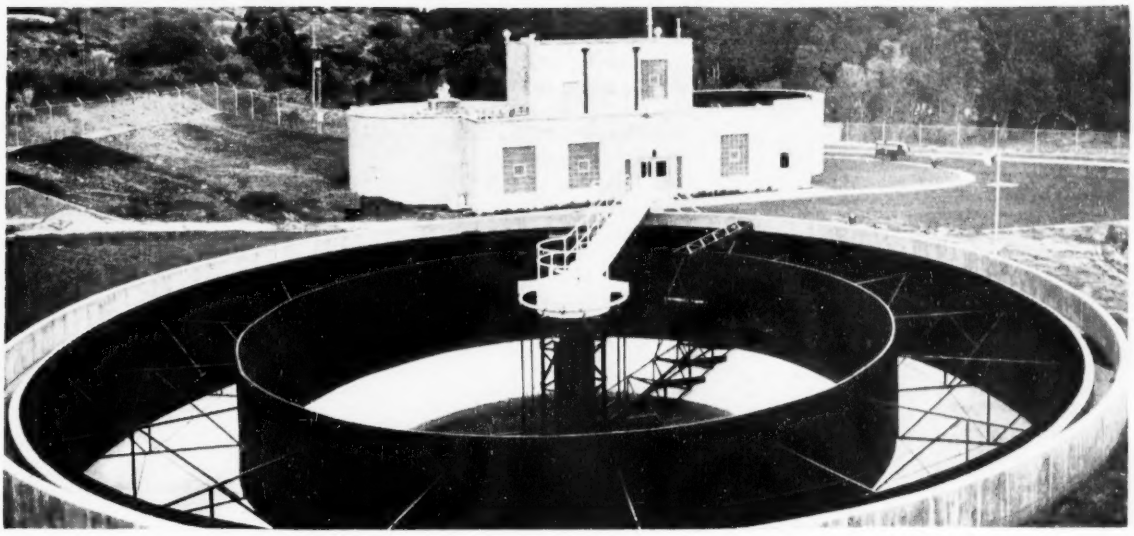
The writer has gone to great length to bring out this requirement, practically quoting it from actual instructions—primarily to emphasize this point as an aid that the food-plant operator can insist upon in the case of sanitation inspection. He can call upon the inspector to tell him if any objectionable conditions have been found. If the inspector fails to outline these conditions, then the food-plant operator should make a point of having a definite understanding with him that he has not found any objectionable conditions.

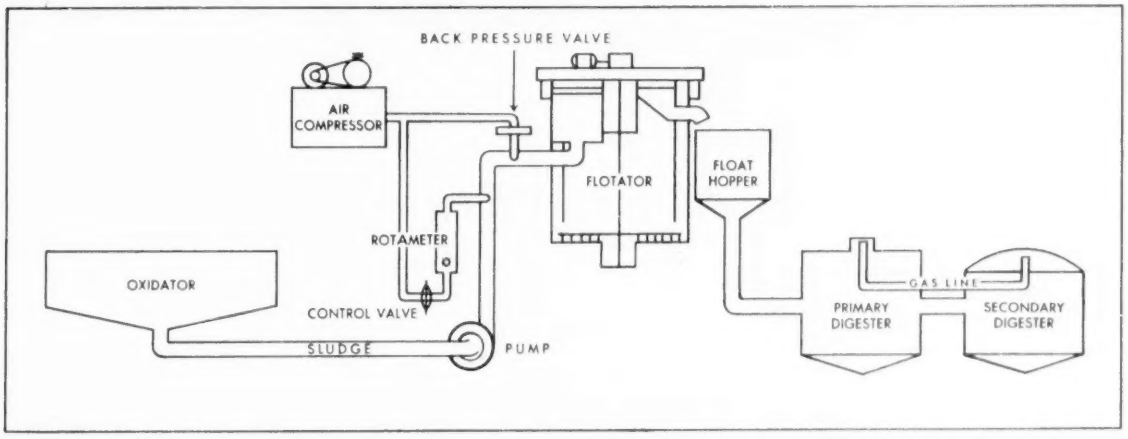
It is understood from the new amendment that a copy of the report will be given to the firm. What form this will take has not yet been announced, but certainly none of the foregoing instructions will be abridged. They are more likely to be enlarged to permit immediate cooperation.

Possible actions resulting from inspections. The government can act upon food products and manufacturers in several ways after such an inspection, if it believes there has been a violation. If the government cannot locate a large shipment to proceed against by seizure, it may issue a citation. This primarily consists of a notice to appear at a hearing to show cause why the food firm should not be prosecuted. A notice may also be issued after seizures are made.

It is a personal conviction that a manufacturer who comes to such a hearing with absolutely "clean hands" and admittedly points out that he has learned in what way he was wrong, then there is a possibility that the government will not prosecute. This is especialy true if the manufacturer does not have a previous bad history of insanitary operation, and is truly cooperative in disclosing not only intent but real facts illustrating actual corrections of the insanitary conditions.

However, to present such a statement and facts in a bona fide and convincing form, it is almost essential that he obtain adequate help from a professional sanitation consultant. Obviously, if he is capable of straightening out his plant after a government inspection, he should have been capable of doing so in the first place. At this time he needs help, and should seek it from suitable sources.





DISPOSAL INSTALLATION and flow diagram. Waste is coagulated in oxidator clarifier tank (foreground in photo). Center section of this unit is aeration compartment where air is injected to agitate waste and begin bacteria digestive process. From oxidator, sludge flow to plant control building (rear), housing pressure flotator, primary digester (in rounded left wing of structure) and secondary digester (in right wing).

Model Waste-Disposal Plant

Erected by Colorado brewery after pilot trials, it utilizes new type bacteria digestion in a speedier operation permitting use of smaller primary tank

FRANK PITMAN
McGraw-Hill West Coast News Bureau Correspondent, Denver.

Food processors who are grappling with waste problems may well cast an appraising eye over the notable innovations incorporated in the disposal plant constructed by Adolph Coors Co. brewery at Golden, Colo.

The new plant—result of a year of painstaking experimentation with a pilot plant—handles waste from the brewery and also all the sewage from the city of Golden.

Formerly, the full load of wastes from both city and brewery were dumped untreated into Clear Creek, outside the city.

The new plant features these primary changes:

1. Use of thermophylic bacteria digestion at 130 deg. F., as opposed to a temperature range of 96-98 F. in conventional plants using mesophylic bacteria digestion.

2. Installation of the first pressure flotation unit in the U. S. for concentrating sewage sludge.

The high temperature digestion method and the flotator permitted construction of a primary digester tank only one-third as large as in a conventional plant. In the flotator, sludge is concentrated up to 12% solids, as contracted with 1.5 to 3% solids in conventional tanks. This results in a smaller volume of water going into the primary digester, reducing size requirements of the tank.

A 75% reduction of volatile solids in 17-20 days, as compared with a 55% reduction in 30-60 days, is made

possible by using the thermophylic bacteria method. Because of this speedier digestion, a smaller tank can be utilized in the high temperature method.

Experiments led to the discovery of two thermophylic bacteria types which, cultivated at 130 deg. F., penetrate the oils and fats that float to the top of the primary digester and break up the sludge blanket. Sludge ordinarily rises to form a tank-top blanket up to 4 ft. thick.

The bacteria also produce methane gas, which is used to operate the boiler heating the primary digester. Multiplying every 20 min., these bacteria are rod types that are Gram-negative (non-staining under the Gram method). They include both acrobic (oxygen requiring) and anaerobic (non-oxygen) types.

Flow and Treatment

In operation, the brewery wastes and city sewage are carried to the plant in a 24-in. clay tile outfall sewer. This is a 1,988-ft. line constructed by the city, and it represents the municipality's only expense in connection with the plant's construction. Brewery wastes are pumped across Clear Creek via a station with an 8-ft. lift to the outfall sewer.

At the plant, the flow first passes through a bar screen that eliminates large debris. The sewage then goes through chambers that remove grit, sand, and similar grainy material. These chambers are designed for 1 fps. flow and 1-min. detention time at peak. Next, the sewage passes through twin comminutors, which crush all remaining matter. The flow then is measured in a Parshall flume, from whence it goes into the oxidator clarifier.

This is a 90-ft. dia., 12-ft. deep concrete tank where sewage is coagulated and settled out as sludge. Air is injected into the oxidator to cause violent agitation of the sewage and start an arcobic bacteria floc that begins digesting the sewage. The aeration compartment in the center of the oxidator was increased from the usual 45 ft. dia. to 60 ft. This was done to obtain a greater reduction in B.O.D. (biochemical oxygen demand) by providing longer aeration, which diminishes more of the dissolved and suspended solids.

In conventional plants, the sludge at the bottom of the oxidator usually runs, as noted, 1.5-3 percent solids. It then passes directly from the oxidator to the primary digester. By using the new flotator, however, sludge can be pumped from the oxidator even if containing only 0.25% solids. The flotator then quickly concentrates the sludge before passing it into the primary digester. The pressure flotator is adjustable at the operator's discretion to concentrate the sludge in any range from 6-12% solids.

Purpose of obtaining thicker and heavier sludge is to reduce handling of water in the primary digester. Sludge from the oxidator is super-saturated with air at the sludge pump before entering the flotation unit. The line from the pump to the flotator is under 20-lb. back pressure. Upon reaching the flotator, the air is suddenly liberated, pulling the sludge to the top, where the concentration of solids is scraped off and discharged into the primary digester.

The pressure flotation process is based on the theory that the amount of gas which a liquid will dissolve is directly proportional to the absolute pressure thereon. For example, 70 deg. F. water at sea level will dissolve approximately 2% of the air by volume. At 15 lb. pressure, solubility is approximately 4%, and at 30 lb., 6%.

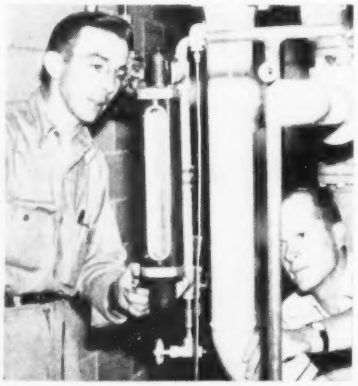
When the pressure is released to atmosphere, the volume of air or gas present above saturation is released, escaping the solution in the form of extremely small bubbles. These bubbles attach to suspended matter present in waste waters and carry these solids to the surface for removal by a skimming operation.

Insulation Details

The primary digester tank is insulated to maintain the necessary 130 F. temperature for efficient utilization of the bacteria. Measuring 35-ft. dia. and 30-ft. deep, the tank is concrete with an outer shell of hollow clay tile. Four inches of insulation were placed between the tile and concrete, blown glass wool being used for the 15 ft. of tank above ground. Insulation on the 15 ft. below the surface is cork with asphalt, which forms a vapor seal. A tile drain was put in to intercept underground water so that it would not carry away heat from the digester.

A 2-in. steel pipeline carries steam from the control house boiler into the primary digester and injects it directly into the sludge to heat it. The steam outlet is at the top of the digester directly beneath a mixer mechanism in the dome of the tank. This mixer is at the top of a draft tube of 2½ ft. dia. and 30 ft. high, extending from the top to the bottom of the primary digester tank.

The tube is funnel-shaped at the top, open at the bottom. A propeller at its top agitates the sludge, mixing in the steam, and shoves the heated sludge downward through the tube to the bottom of the tank.



CHECKING controls on pressure flotator unit. Note Rotameter.

Fertilizer By-product

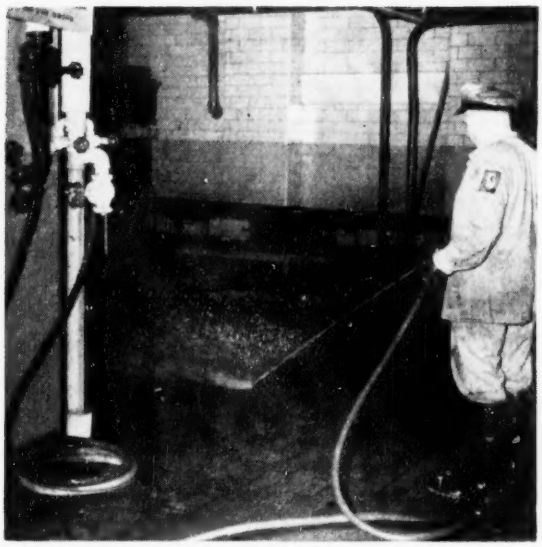
Methane gas converted from volatile solids by the thermophylic bacteria is piped from the primary digester to the secondary digester tank for storage. This gas is not greater in volume than that produced by conventionally-employed mesophylic bacteria at lower temperature, but it is produced in shorter time, at a rate of 15,000 cu. ft. per day. Sludge, which goes by gravity feed to the same tank, is stored there until enough accumulates to justify drying it. It is subsequently used for fertilizer.

The secondary digester tank is not heated. Consequently, the thermophylic bacteria action, which requires 130 F. temperature, ceases almost entirely. Any gas created by such remaining action as may occur rises to the top of the tank along with the gas piped there from the primary digester.

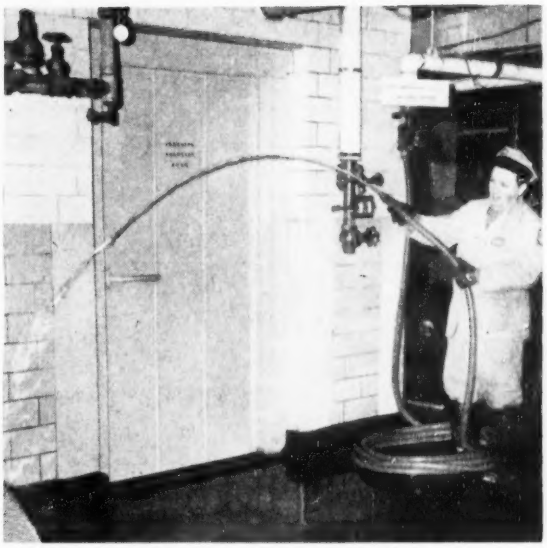
Topping the secondary digester tank is a 35,000-lb. floating steel dome with a height range of 6 ft. The tank is of the same dimensions as the primary digester. As the gas storage increases, the steel top rises, so that its weight maintains a 6-in. pressure on gas lines to the control house. Methane gas flows through these lines to the gas-fired boiler, which is under 15 psi. pressure. Steam from the boiler in turn heats the primary digester.

The new plant has been designed for a peak capacity of 3,000,000 gal. of sewage per 24-hr. day. Present waste and sewage flow to the plant averages 1,500,000 gal. per day, with approximately half the volume from the brewery. The city will bear about half the cost of operating and maintaining the plant.

Pilot plant experiments were carried out by the brewing company, which is making its facilities available to Colorado colleges for experimentation in sewage disposal and also for teaching sanitary engineers.



IN RACKING ROOM. Floor receives final rinse with chlorinated water. Blue taps (left) indicate treated lines.



IN FILTER ROOM. Walls, too, get final rinse with treated water. Hose used is same distinct color as taps.

"We're *Sure* Everything's Clean"

Say Schaefer-Plant Executives

... And what makes them sure is chlorinated rinse that backs up routine with positive sterilization

FE STAFF

To be assured of sterile wall, floor, and equipment surfaces, especially in high-humidity areas, The F. & M. Schaefer Brewing Co., Brooklyn, supplements its normal washing with use of specially treated chlorinated water as a rinse. Sanitation in the brewery, say company officials, is of such prime importance that it warrants this added preventive action.

Results obtained over the last two years with this program, which is under the supervision of Dr. John B. Bockelmann, technical director, have been so satisfactory that the practice is to be extended to additional equipment and other plant areas.

During the original period, the treated water was used for general washing in the storage cellars, racking room, and filter room. Now under consideration is its application in the washhouse as a final rinse in the cleaning of stainless steel kegs. In the racking room it has been employed on the floor and walls and is to be extended to the equipment proper.

Another intended use is with the pulp filters. Thus, it will be possible to sterilize in place a finished, packed pulp filter on the line. Two advantages are foreseen: First, this will provide a sterilized filter ready to put into operation; second, continued sterilization during standby periods.

In the cleaning of these filters, the screens, too, will receive a brushing and rinse with the chlorinated water. Also, this water will be used in the cleaning treatment given the filter mass. The move to these practices is underway as this is written.

In the initial operations, the chlorinated water was used to eliminate the possibility of bacteria or yeast growth in the surface pores of the concrete floors and joints, also crevices in the masonry walls and floors.

Supplied from a central point in one building, the chlorinated water is distributed through individual lines. The chlorinator, a Wallace & Tiernan MASVM unit, is housed in an individual room, kept under lock and key.

Operation of the equipment is completely automatic following an initial manual setting of the base rate. Control for the feed is via the differential across an orifice plate installed in the main water line, with transmission to chlorinator via a converter.

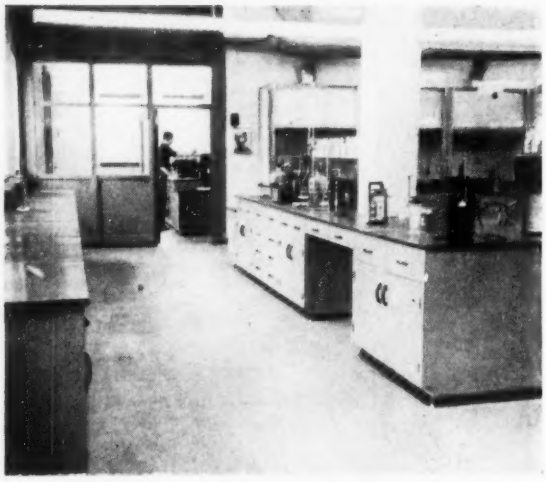
This equipment has been so engineered that when a flow is created in the main line (used only during the cleaning period), a pressure switch actuates a booster pump which, in turn, starts the chlorinator. From this point on, the unit feeds chlorine in proportion to the flow of water. As now hooked up, it can be pre-set to any residual between 0 and 15 lb. of chlorine per 24 hr. In actual operation, maximum concentration is limited to 12 ppm.

As used by Schaefer, concentration of the chlorine runs 5 to 10 ppm., the average being about 7. Tests have proved that if water at this concentration comes in contact with the product the results are not harmful. This concentration is, however, sufficient to be lethal to undesirable molds and bacteria.

To assure that this water is used only as intended, the company has installed a separate distribution system. The lines, like all others in the area, are insulated and can be readily identified by a distinctive blue band.

Further, each outlet tap for the chlorinated water is painted this blue. And for an added precaution, signs directly above the taps note the use of this water. These signs are also printed in the blue, on a white background. Then, too, the hose lines used in conjunction are of the same blue.

TERRAZZO floor in shower room is treated with special sealer, then maintained with wax-containing cleaner.



NEW CEMENT floor in lab should be cleaned, then treated with two coats of resinous sealer and water-emulsion wax.

RUBBER TILE surface in cafeteria is coated with water-emulsion wax, buffed with steel wool, and again wax-coated.

HARDWOOD area in candy plant should be reconditioned with sealer and coated to withstand hard usage.

How to Keep Floors Ship-Shape

4-point quick-reference guide gives you pertinent money-saving plan for cleaning, sealing, maintaining, and inspecting the various-type surfaces

A. L. SODERGREEN

Director of Research, West Disinfecting Co., Long Island City, N. Y.

Floors are a major capital asset. Yet industry too often walks all over them beyond the bounds of the literal meaning.

During 1951, for example, industry spent an estimated $300 million on flooring—a large percentage of which went to replace flooring that wore out before its time.

With proper care and a systematic floor-maintenance program, much of such expense wouldn't be called for.

One reason for neglect is the high controversy attending the subject of floor maintenance. Advice and opinions vary widely. And it's little wonder if the resulting confusion tends to hinder progress toward systematic floor maintenance. All too often this situation leads to a plant doing nothing—until a major floor revamping job must be undertaken.

Costs Worth Conserving

New flooring is expensive. Based on reports from reliable contractors in urban areas, these are the typical costs for 50,000 sq. ft. of various-type new flooring: Asphalt tile, $15,000; concrete, $18,000; linoleum, $21,000; hardwood, $27,000; cork, $39,000; rubber tile, $44,000; vinyl tile, $44,000; ceramic tile, $65,000; terrazzo and mosaic, $87,500; and marble, $150,000.

Unfortunately, there is no product that will protect and preserve flooring in one effortless application. However, the problem can be resolved to four fundamentals—cleaning, sealing, maintaining, and systematic inspecting—comprising *the* approach to a good floor-maintenance program. Once these four essentials are adapted to a particular floor, the groundwork is laid for a continuing maintenance program that can be economically followed. Full functional life of the floor will then be assured, and the need for premature resurfacing jobs will be eliminated.

To provide practical help in this direction, the accompanying guide to the maintenance of various types of floors is presented.

Handy Floor-Care Guide—Covers Dozen Different Surfaces

Floors	Cleaning	Sealing	Maintaining	Inspecting
Old Wood	1. Remove wax, oil, grease, and dirt with approved wax removers, degreasers, and soap solutions. 2. Bleach stains (if desired) with oxalic acid solution and rinse thoroughly. 3. When dry, sand thoroughly (if required), with amount of cut depending on floor condition. 4. Pick up all wood dust with tack rag dipped in sealer and wrung.	1. Be sure floor is clean, dry. 2. Apply this coat of approved penetrating sealer, buff lightly with steel wool after 15 min., and allow to dry 1 hr. 3. Apply thin coat of resinous sealer, let dry, buff lightly, and pick up residue with tack rag. 4. Apply second thin coat of sealer and allow 10–12 hr. to dry. 5. Buff lightly if satin (instead of glossy) finish is desired.	1. Apply 1 or 2 thin coats of water-emulsion wax or use deodorizing type cleaner containing wax. 2. Use antiseptic dust-control compound to enhance appearance and lay dust.	1. Look for dirt and imbedded foreign materials not caught in routine cleaning, and remove as soon as noticed. Rewax area if necessary. 2. Dull or discolored areas indicate wear of the wax coating. Surface should be cleaned and rewaxed.
New Wood	1. Clean thoroughly with solution of approved mild soap. 2. Sand thoroughly. 3. Pick up all wood dust with tack rag dipped in sealer, wrung dry.	1. Same procedure as recommended above for old wood floors.	1. Same procedure as recommended above for old wood floors.	1. Same procedure as recommended above for old wood floors.
Old Linoleum	1. Remove wax by careful scrubbing with oil-base soap. Paste waxes can be removed with acceptable thinner. 2. Scrub with clear water and allow to dry thoroughly. 3. Buff with No. 00 steel wool.	1. Seal thoroughly-cleaned, dry linoleum by applying heavy, even coat of acceptable penetrating varnish sealer. Allow 15 min. for penetration, and wipe up excess with clean dry rags. 2. Buff with steel wool. 3. Apply second and third coats of sealer as needed, buffing with steel wool between applications.	1. Apply 1 or 2 thin, even coats of acceptable water-emulsion wax, or maintain surface with deodorizing cleaner containing wax. 2. Control dust on well-waxed floors with approved oil-base antiseptic compound.	1. Watch for uneven wear of surface and correct with protective coating of wax. Clean and reseal if wear is extreme. 2. If finish becomes dull, clean and rewax. 3. Check frequently to make sure routine cleaning is removing all dirt and other foreign materials before they become imbedded.
New Linoleum	1. Clean with mild type oil-saponified liquid soap, diluted according to manufacturer's directions. 2. Rinse with clear water and allow to dry thoroughly.	1. Not required. New linoleum has been finished by manufacturer and should not be sealed.	1. Maintain original surface with thin, even coats of approved water-emulsified wax finishes. 2. If initial waxing is impractical, surface can be maintained with approved cleaner containing wax. 3. Control dust with approved oil-base antiseptic compound.	1. Same procedure as recommended above for old linoleum.
Asphalt Tile	1. Scrub carefully with proper dilutions of approved soluble powder cleaners of mild-type liquid soap. In badly deteriorated tiles, colors may run, even using plain water. 2. Rinse and allow to dry. 3. Buff, using flexible pad of No. 00 steel wool in polishing machine. 4. Pick up all residue with vacuum.	1. Apply at least 2 thin coats of an acceptable mastic sealer, specially designed to prevent color running from subsequent floor maintenance treatments. (Note: So-called "grease-proof" asphalt should not be sealed.)	1. Apply at least 2 coats of approved water-emulsion wax, buffing with No. 00 steel wool between each application. 2. Brush daily with soft hair brush. No. 00 steel wool. Clean periodically with deodorizing cleaner containing wax. 3. Control dust on well-waxed asphalt tile with approved antiseptic compound.	1. Same procedure as recommended above for linoleum.
Rubber Tile	1. Brush loose dirt from floor. Old, porous rubber should first be buffed with No. 00 steel wool. 2. Clean with acceptable soap or special rubber cleansers, according to directions. 3. Rinse, let dry thoroughly. 4. Buff with No. 0 steel wool.	1. Rubber tile floors should not be sealed.	1. Apply thin, even coat of water-emulsion wax, let dry 'til hard. 2. Buff with steel wool, and repeat with second coat of wax. 3. After waxing, buff systematically to reduce number of washings. 4. Control dust on well-waxed floors with approved antiseptic.	1. Same procedure as recommended above for linoleum, except for scaling.
Cork	1. On newly installed floors, allow 7 days for bonding cement to set. 2. Clean thoroughly with mild-type scrub soap.	1. Apply 2 coats of approved penetrating varnish sealer to thoroughly dry floor. Buff each coat with fine steel wool.	1. Apply at least 2 thin coats of acceptable water-emulsion wax, and buff.	1. Same procedure as recommended above for linoleum. However, watch particularly for scuff marks that mean resealing.
Cement	1. Remove chemical hardeners from new concrete by scrubbing and flushing with hot water. 2. Remove all wax, oil, grease, and dirt with approved wax removers, de-greasers, and soap. 3. Rinse away all traces of cleaners with hot water or steam. 4. Etch with muriatic acid solution and rinse with hot water. 5. If test shows dampness, apply approved special primer, rinse with water, and allow at least 8 hr. for thorough drying.	1. Treat with 2 thin, even coats of approved resinous sealer (either pigmented or clear). Allow thorough drying between applications. For high gloss, apply coat of clear sealer over two coats of pigmented sealer.	1. Wax with 1 or 2 coats of approved water-emulsion wax, or maintain with deodorizing cleaner containing wax. 2. Use antiseptic dust-control compound to enhance appearance and lay dust.	1. Watch for dusting or powdering of surface. These are sure signs that surface should be sealed. 2. On sealed floors, watch for chipped areas, which should be resealed. 3. Make sure foreign materials are removed during routine cleaning. 4. Sealed floors that become dull should be rewaxed.
Terrazzo	1. Scrub with acceptable cleaners until all traces of old soap films and other foreign materials are completely removed. 2. Rinse and remove excess water. 3. Allow to dry thoroughly, then test small area with water to see that pores are open.	1. Densify with 1 or 2 coats, as needed, of approved terrazzo sealer. Avoid building up surface film.	1. Treat dry, sealed surface with acceptable cleaner containing wax. 2. Use a soft bristle broom or brush daily. Repeat applications of wax-cleaner occasionally.	1. Watch for dull or discolored areas. These should be cleaned and rewaxed at once. 2. Make sure the sealer coat is in good condition at all times to prevent pitting of surface.
Ceramic Tile	1. Clean with acceptable soap-type cleaner and rinse thoroughly with water.	1. Seal severely etched tile with coats of thinned varnish sealers of approved type. Allow time to dry between applications.	1. Wax with approved water-emulsion wax. 2. Use antiseptic dust-control compound in sweeping.	1. Watch for dull or discolored areas. These should be cleaned and rewaxed at once.
Slate & Quarry	1. Same cleaning procedure as recommended above for ceramic.	1. Same sealing procedure as recommended above.	1. Same maintenance procedure as recommended above for ceramic.	1. Same procedure as recommended above for ceramic tile.
Marble	1. Wet surface and clean with acceptable mild-type scrub soap.	1. Special resinous sealers are effective on exposed installations. But in most instances, sealing of marble floors cannot be generalized.	1. Acceptable water-emulsion waxes may be used. 2. An antiseptic dust-control compound may be used on waxed floors.	1. Make sure routine cleaning is removing all dirt, stains, and discolorations. Make certain cleaner is not harming floor surface.

AERIAL view accents ample 140,000-sq.-ft. layout of Baird's new bread plant. Housing two automatic bakeries under a single roof, it is arranged so that a third can be added to step-up production another 50%. Structure is completely air conditioned. Garage holds 60 delivery trucks.

Pace-Setting 2-in-1 Plant

Quadruples Output in Seven-Phase Advance

Quality and sanitation boosted, too, in unique twin-bakery . . . "Eye to automation" marks striking new engineering of handling, mixing, heat transfer, forming, fermenting, slice-wrapping, and air conditioning

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

Jumping bread production from 3,500 loaves to 14,000 loaves every hour! You can put that down as a foremost achievement, no matter what other big developments may be competing for attention in the food industry.

When such an advance abounds with engineering innovations, it takes on a double significance.

And that is what you have in the new plant of Mrs. Baird's Bakeries, Inc., which is now serving the Dallas, Tex., area.

To keep up with the increasing demand for its freshly baked bread, Baird's recently rushed to completion two automatic bakeries for operation under the same roof, each independent of the other. These two bakeries, separated by only a few feet of space, are similarly equipped with the latest units for moving ingredients directly to mixers, through unit operations, and right up to the delivery truck-loading dock.

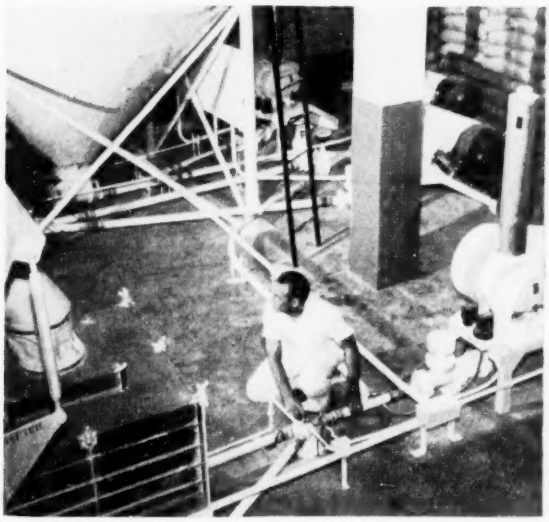
"While each bakery is geared to produce 7,000 loaves hourly, we can actually squeeze an additional 2,000 from both," says vice-president W. D. Baird, who supervised construction and planning of this mammoth facility.

Aside from keeping up with demand, this huge production capacity serves another purpose. It shortens bread-handling time from ovens to grocers' shelves. This means fresher loaves for consumers.

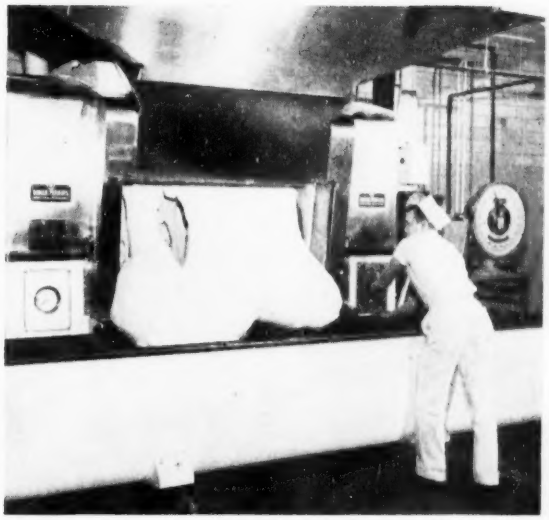
Faster output is not the only factor assuring quality loaves. Temperatures are now more accurately controlled in storage areas and the bakeries proper by two 100-ton water chillers that furnish refrigeration to the various air-conditioning units. Such control measures mean uniform bakes and bread of consistent flavor, texture, and keeping quality.

Area about the ovens is isolated from other parts of the bakeries by a canopy that extends from ceiling to within 6½ ft. of the floor. This prevents oven heat from upsetting the balance of the air-conditioning system. As a further precaution, fans are provided to exhaust oven heat through

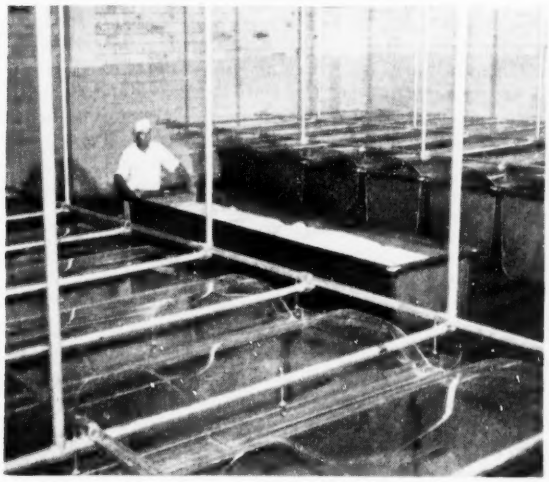
High-Speed In-Line Production Units



PNEUMATIC flour system handles 250 lb. per min. Baking Superintendent Carr adjusts selector to start flour rushing from blender to storage bins.

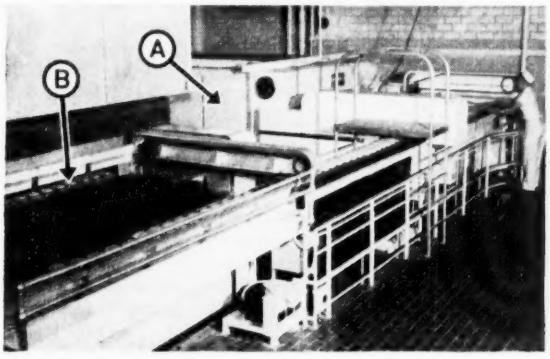


THIS 2,000 lb.-capacity dough mixer, operated by Baker Jackson, is called biggest ever built, handles five batches of sponge mix hourly.



PLEXIGLAS-COVER trough-fermenting system abolishes need for automatic temperature and humidity controls. Covers retain layer of moist air over sponges.

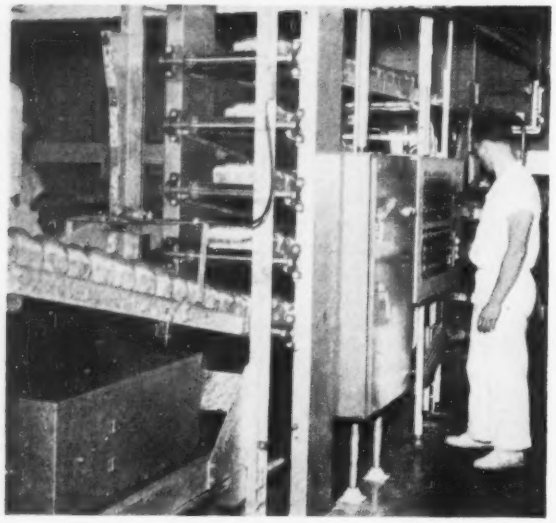
PAN GROUPER, with electric eyes (arrows), unites two lanes of pans coming from molders to single lane going to proofer. Technician Grunden checks "eyes."



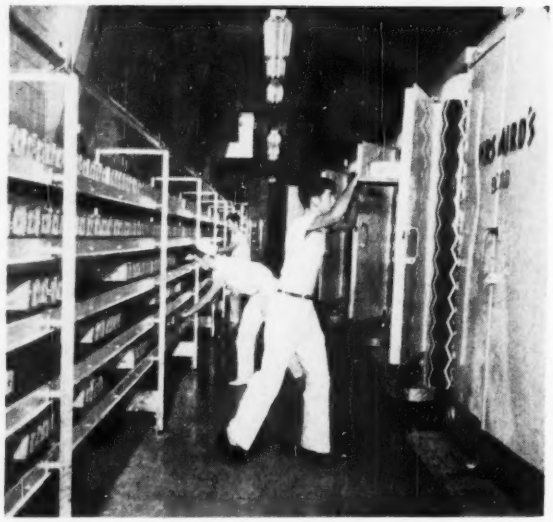
MAGNETIC BAR unloads 20 loaves at a time from 330-ft. proofer (A) onto transverse conveyor. Loaves are then automatically fed into 110-ft. oven (B).

AT END of oven, depanner dumps baked loaves from pans and onto cooler conveyor. Magnetic device removes Pullman lids from pans. Lids and pans go on return belt.

These Movers Speed Handlings To and From Wrappers



TIER SELECTOR automatically channels 20 loaves to one slicer conveyor. It then moves up or down to portion another group of 20 to next slicer conveyor.



FROM multi-tier Wendway conveyors, wrapped loaves are speedily loaded into waiting delivery trucks. Conveyors replace former portable racks.

thermostatically controlled stacks to outside atmosphere.

The new bread bakery comprises 140,000 sq. ft. of floor space on 6¼ acres of land. Size of the two-story bakery is 86x512 ft., with an adjacent one-story garage for 60 trucks confined to an 80x412-ft. area.

Set for Expansion, Too

Future-expansion problems are seen easily solved because of initial careful planning. The simple, side-by-side arrangement of the two complete bakeries will enable installation of a third 46x512-ft. bakery, which would increase production still another 50 percent.

The bakery's exterior is constructed of brick. Windows have been omitted in the bakery and storage areas to facilitate sanitation and control of temperature. Walls in all working areas are of glazed tile up to a height of 7 ft., and floors are of concrete or brick.

Unloading docks at rear of plant accommodate five box cars and three motor transports. Fork-lift trucks haul all incoming supplies through a switch-controlled, "air-lock" corridor, which is designed to keep in the conditioned air and to keep out insects.

Facilities in the air-conditioned storage area hold 33 carloads of ingredients—sufficient for 10 days' production. A separate 55 deg. F. room holds 125 drums of shortening.

To illustrate the planning behind this new bakery, W. D. Baird, R. W. Baird, Jr., and C. C. Gressett visited outstanding bread plants throughout the country. Then, working in close cooperation with plant designers and equipment manufacturers, the new highly efficient pace-setting twin-bakery was laid out.

Long experience coupled with on-the-spot study of setups in other plants enabled the planners to get a magnified view of bottlenecks for remedial evaluations. Outcome was the installation of bottleneck-breaking units—some of which are brand new developments in a bread bakery.

Advanced Shortening Handler

Significant is the new sanitary, automatic handling, melting, screening, and metering of shortening directly from drums to mixers. Designed by Ferry Steel Products & Equipment Co., San Francisco, this advanced system operates in this manner:

Each drum is loaded onto a lifting carriage, which is automatically raised to dumping position by the press of a pushbutton. Electric heaters in the carriage then melt the solid shortening free of the drum and into a 3-drum capacity holding tank. Heaters in this tank continue the melting, and the shortening is recirculated by sanitary pump to speed up the melting cycle. Temperature of the fluid shortening is maintained at 120 deg. F. by thermostatically controlled heaters inside the tank.

Liquid shortening then flows through an electrically heated, insulated, 1-in. standard black pipe to a control panel in the mixing room. Mounted on this stainless steel panel are meters, strainers, and pushbuttons. The latter open and close solenoid-operated valves on the mixers to permit flow of shortening through strainers and into mixers. Flow is at the rate of 50 lb. per min. Amount of shortening delivered is observed on the meter dial. The meter is re-set to zero before another batch is fed to the mixer.

Sanitation is achieved through installation of a pneumatic system of moving flour.

With the new, totally enclosed system (a Fuller Co. development), air pressure carries 250 lb. of flour per min. from blender, through storage bin and 6-screen mechanical sifter, to scale hoppers feeding mixers. A remotely controlled line valve returns flour in-transit to storage bin to avoid over-run.

When the flour supply is shut off in this high-velocity, high-pressure system, air continues to rush through the lines to keep them clean.

A white-flour blender supplies either the sponge or dough storage bins. Capacity of each is 24,000 lb. The wheat-flour blend supplies a 5,000-lb. capacity storage bin.

Special Fermenting System

Adoption of a covered-trough fermentation system eliminates the need of temperature and humidity controls. Temperature and moisture generated by rising sponge in the trough is retained by Plexiglas covers.

Supported from the ceiling by aluminum pipes, the covers are suspended ½ in. above the stainless steel troughs. They eliminate drafts across the top

of the troughs and retain a layer of moist air over the sponges.

Some bakeries employ covers of stainless steel instead of the transparent Plexiglas.

To keep up with the increased oven capacity, larger dough mixers had to be designed by the equipment manufactuer, Baker-Perkins Co. Now installed are two 2,000-lb. capacity dough mixers—the largest of their kind—for handling five 1,600-1,700-lb. batches of dough hourly.

Mixers are of the direct expansion type and Freon-refrigerated. Parts refrigerated are the bowl, ends of the bowl, and door.

Here also, special sanitary features have been incorporated. Stainless steel has been used liberally on exteriors of the machines to facilitate cleaning. Mixers are water-proof and dust-tight so that they can be washed down easily.

Agitator glands have been designed for quick removal, and hubs are accessible for cleaning. There are hinged doors through stainless steel guards for ready access to removable glands. Also, agitators in mixing bowls are built for quick, easy cleaning.

Electrical control panels are within water-proof, dust-tight compartments in the ends of the mixers.

Different from other installations is a stand-by refrigeration system that can be cut into either mixer within 5 min. in the event of failure of the direct expansion systems.

Proofers Are Longest

Final steam proofers are the longest tunnel-type units yet built by Baker-Perkins. Each proofer is 330 ft. long and is divided into three zones. And each zone has a panel for the control of temperature and humidity.

Proofing time is 65 min., and any change is accomplished by altering the temperature and humidity within each zone.

Maintained in each proofer is a temperature of approximately 104 deg. F. and a humidity of about 75%. Better control of dough loaves is thus achieved through the 3-zone system of varying temperature and relative humidity.

Drive for the proofer conveyor is controlled from a front power panel. Motor-generator sets deliver direct current to make possible variable speeds for the proofer conveyor. This conveyor also features a dual drive so that it can be operated from feed and discharge ends. A dual drive is needed because of the length of the proofer conveyor.

At the discharge end of the tunnel proofer, a magnetic bar removes 20 pans of dough at a time and deposits them onto a cross conveyor for automatic feeding into the oven. Powered by a fluid drive, this cross conveyor runs smoothly, thus prevents shifting of pans.

Latest Type Ovens

Each of the two bakeries has its own fully automatic grid-hearth, tunnel-type oven (110x10 ft.). The Baker-Perkins ovens are direct gas fired and provided with separate top and bottom heat controls. Nine modulating temperature control and indicating instruments provide full flexibility in heating requirements in each zone.

Adjustment of heat is provided for each burner. And an integral part of the gas equipment is a stand-by blower.

Two glass observation windows have been installed in each oven. One is at the feed and the other at the discharge end.

At the discharge end of each oven is a new completely automatic combination delidder-depanner. The delidder employs a magnetic device that picks up Pullman lids, 20 at a time, and deposits them on a conveyor traveling to the feed end of the oven. Even badly warped lids are handled without difficulty.

Provision has been made to enable an operator to place the return lids on Pullman pans in an area between the delivery end of the steam proofer and oven feed.

With lids removed, the depanner tilts and dumps 20 loaves of 22 min.-baked bread from the pans for delivery to the cooler-feed system. Meanwhile, the pans are dumped onto a conveyor feeding an automatic divider—first of its kind. Hot pans are divided by a single T-bar that pivots from side to side as pans approach and alternately moves them into two lines.

Pans are automatically greased while they are hot, and then conveyed through the cooler. Immediately following the divider is a storage conveyor designed to provide maximum capacity through the pan cooler conveyor. The latter comprises two table-top chain conveyors mounted on a single structure, which is completely hooded to prevent upsetting air-conditioning efficiency. Cooling is achieved by fans that force air into the cooler and exhaust hot air fom it.

Regrouping of the pans takes place after the panning operation and prior to proofing—at the intersection of the two conveyors. It is accomplished by a Baker-Perkins pan grouper that automatically unites two lines of steadily-moving loaded pans into a single line.

There are automatic stops on each conveyor carrying pans from panners. With the aid of electric eye arrangement, pan stops are alternately opened and closed to form a single line going to the steam proofer. When a pan rides over a stop and breaks the light beam, the stop on the other conveyor is closed. Then, when the beam is no longer broken, the opposite stop opens so that pans are admitted from the other conveyor.

Regardless of any variation in incoming flow of pans, the automatic grouper spaces (as desired) rows of pans going into the proofer. Because of this spacing, loaves are more uniformly proofed and baked—another automatic quality control measure.

Controlled Cooling

Each of the two traveling-type tray coolers is equipped with ar-conditioning units. Air brought in from outside the bakery passes through a spray washer, where it is filtered, cooled, and humidified.

To save floor space, coolers are suspended from the ceiling—on the floor below the ovens. They are completely enclosed and provided with hinged metal panels along their entire length for access during cleaning operations.

From the two coolers, bread is conveyed to a battery of seven mechanical slicers and wrappers. Handling of bread from coolers to slicer-wrappers is stepped up by two remote-controlled, automatic tier-selecting units.

Developed by Union Steel Products Co., the tier selector channels 20 loaves at a time to each slicer conveyor. Selecting of the cooled loaves is done in this manner:

An attendant, operating a push-button-control panel, starts and stops the conveyors and tier selector. He also operates Wendway conveyors carrying bread from wrappers to the truck-loading area.

As each group of 20 loaves approaches the selector, it moves rapidly across a 6-ft. bridge to the 8-ft. five-tier sections for regrouping and smooth feeding to a slicer. When discharged from the selector, the electrically controlled, hydraulically-actuated conveying bridge is raised or lowered to the next tier, ready for the next group of loaves.

In place of roller-equipped racks formerly used to deliver wrapped bread from wrappers to delivery trucks, five tiers of stainless steel conveyors are now employed in the new plant. Checkers and loaders now merely move down the row of 60 trucks and load each from the conveniently arranged, slow-moving multi-tier conveyors.

ITS IMPROVED flavor teams with greater convenience to boost soluble's post-war popularity. Its sales volume has climbed to big figures.

What Makes

Good Soluble Coffee

Insuring proper flavor in reconstituted drink calls for blends of beans and types of roast different from those used by "roasters" . . . Key factors of extracting and drying are carefully weighed

WILLIAM C. WINOKUR

Formerly Technical Director, The Harrison Co., New York

Many of the early attempts to produce a good soluble coffee proceeded on the theory that whatever type green and roasted beans had been used for bag or vacuum packed coffee were the type that should be used for soluble.

There was a complete lack of understanding of the effect of subsequent processing—extraction, concentration, drying—on the cup quality of the finished product.

It has been proved that the most important factors in a consistently high sales volume are uniform aroma, color, and flavor—be it roasted, ground, or soluble coffee.

Also, selection of green beans and subsequent roasting are of tremendous importance to the quality of finished product.

A certain bean, or blend of beans, may result in a highly aromatic, full-bodied roasted coffee if cupped at that point. But it might end up in a flat, characterless cup of soluble coffee. Yet, hypothetically, this same bean or blend could prove suitable for a soluble coffee when a different type of roasting is employed. Thus, both the blend of beans and the type of roasting have a definite effect on the finished product.

Cleaning of the beans is a relatively simple operation, but its importance to the production of a good product cannot be minimized. Here, between raw green beans in chutes and clean beans in bins, two operations are performed. First, an air-separator removes particles lighter than coffee kernels. Second, rotary screens allow only the beans to drop through while retaining larger foreign particles.

HOW A TYPICAL soluble coffee production line operates is graphically portrayed in this month's special FE Foldout Flowsheet. You'll find it on pages 118-121.

Roasting

Judging completion of a given roast by eye is a highly skilled operation—a job not given to a green coffee man (in terms of experience). Truly a specialty operation, it is entrusted only to the best personnel. But since it involves the *human* element, it is not infallible.

End point of a roast may be at a temperature of 410 deg. F. or more, with the roasting time approximately 20 min. Temperature increases occurs mostly at the close of this cycle. It is, therefore, advantageous to utilize extremely sensitive instruments that measure and control with highest accuracy and give instantaneous response.

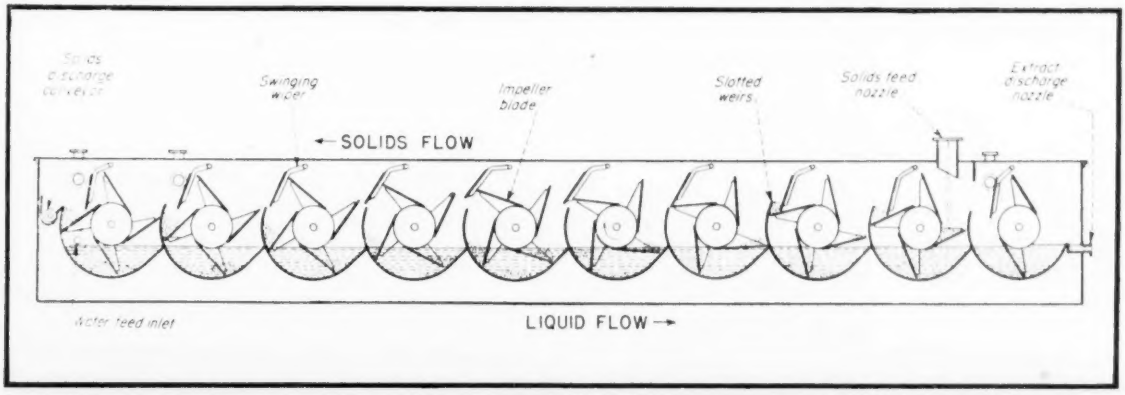
Modern plants now employ semi-automatic and fully automatic roasters equipped with electronic controls that virtually eliminate the human element. In the fully-automatic, the operator need only press a "start" button. Complete cycle of roasting followed by quenching proceeds, then a green light goes "on" to indicate end of period.

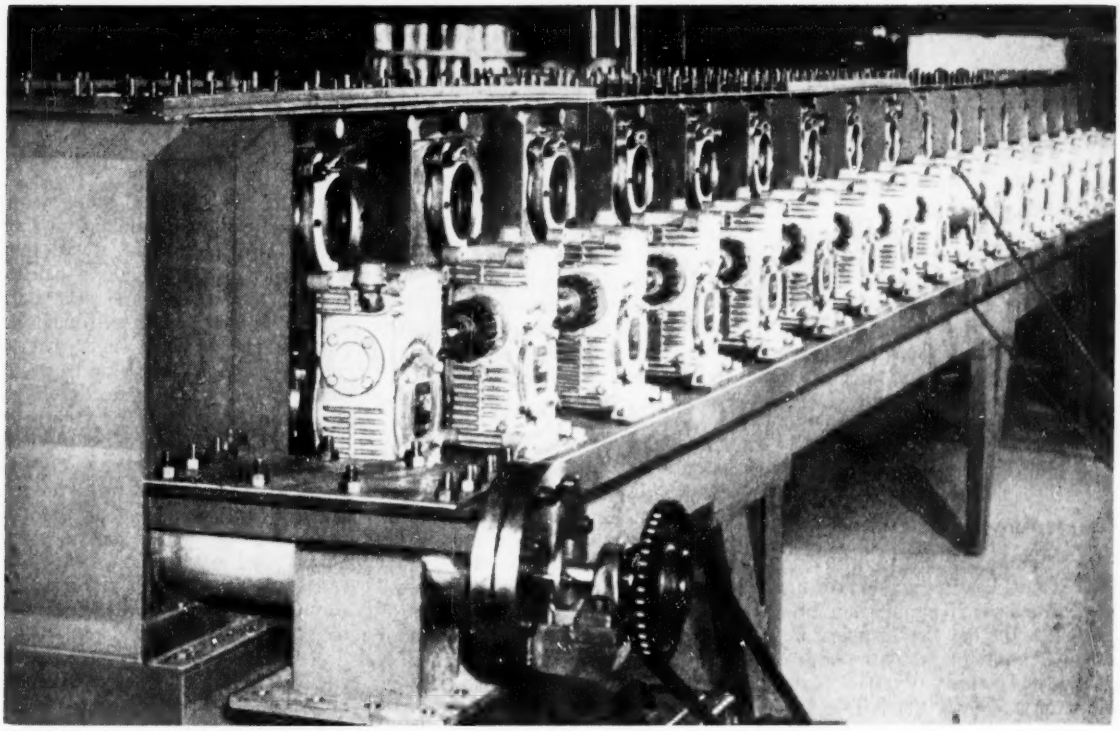
Discharged from the roaster the beans are cooled to room temperature by an air blast. Following cooling they pass a magnetic separator, for removal of tramp iron, and the stoner, where heavier particles than the roasted beans are separated. Then comes blending.

Grinding

On the matter of grind size, manufacturers of soluble coffee face a problem entirely different from that encountered by producers of packaged, roasted coffee. The roasters (term usually applied to the latter) have in mind the ultimate consumers' several methods of preparing the beverage. In other words, they make a number of different grinds.

In considering selection of a proper grind for extraction purposes, one must take into account its suitability to the particular type of extractor being used. A highly pulverized grind (almost powered) will be extracted at an extremely great rate with a small quantity of water. Coarser grinds may yield the same amount of soluble solids but they will take more time and perhaps a higher temperature during the extraction period, and certainly more water will be required. In general, however, flaked or crushed coffees are not





CONTINUOUS EXTRACTOR, shown here in both drawing and photo, employs slowly revolving impellers to move ground coffee through solvent in each compartment. Spent grounds are discharged to conveyor (left in photo). Water enters at left, moves counter to coffee, discharges (as extract) at right.

adaptable to presently existing extraction equipment, which require that a No. 10 sieve hold most of the particles.

Extraction

Some of the important factors in extraction are:

1. Design of the extraction chamber
2. Ratio of solvent to solute
3. Temperatures within the system
4. Pressures within the system
5. Grind size
6. Time of extraction

Extractors employed in today's plants were in most cases custom built, with incorporation of special features that are supposed to facilitate maximum removal of desired solids.

In general, the systems comprise a number of individual percolators connected in series for countercurrent operation. Units may be perfectly cylindrical, or somewhat conical. Some are swivelled for easy removal of spent grounds, others have provisions for dropping them through the bottoms. Liquid usually enters at the bottom and is discharged at the top.

A continuous extractor of entirely different design has recently been installed in several soluble plants. In this unit, ground coffee is charged continuously at one end and moves slowly toward the discharge at the other. Water travels counter to movement of coffee (see illustration above).

Ratio of solvent to solute is simply an expression of the mathematical relationship between ground coffee and water. The ratio of the two (by weight) is of prime importance, for these two fundamental reasons:

First, concentration potential for mass transfer from the solid to the liquid phase is controlled primarily by this ratio. Incidentally, the concentration potential is directly proportional to the extraction rate.

Second, this ratio determines the solids content of the finished extract and thus has a definite influence on the subsequent drying costs. Further, as the solids content of an extract increases there may be a shift in equilibrium of the less soluble compounds. This tendency may result in proportions of flavor constituents that are different from those found in a

"CERTAINLY, the extremely sensitive, expert cup tester is necessary. It is with his labors that the entire process begins."

cup of coffee prepared directly from the roasted ground bean.

A given quantity of water may remain in the extraction system for a total of 5-8 hr. During this time, the coffee in each percolator is subjected to varying degrees of extraction, with the spent coffee receiving fresh water at 140-200 deg. F. Liquid will be allowed to extract the coffee in each unit for periods ranging up to 90 min. Drop in temperature is progressive from 200 to approximately 100 deg. F.

Temperature Within System

Just a short acquaintance with chemical-reaction kinetics and processes of physical chemical equilibrium brings quick concurrence that temperature is a truly important factor in both extracting and brewing of coffee. Making a cup of coffee is much more than dissolving constituents of the bean that are water soluble. Also concerned are the hydrolysis reactions. Degree of completion and equilibrium of compounds of these reactions are functions of the temperatures employed during the process.

In the earlier days, I leaned heavily toward the production of "cold" extracts. But, with more detailed experience and knowledge of what really constitutes a good cup of coffee, it became evident to me that *cold* extracts were not truly *whole* coffee extracts. These were "double dealing," in a manner of speaking. On the one hand, they *lacked* something. But they appeared, at the same time, to be sweeter than a standard cup of coffee.

The lack was due, undoubtedly, to the loss or lesser concentration of some constituents that are more soluble at higher temperatures. The plus factor, or apparent added sweetness, probably was caused by one or more constituents that were more soluble at low than at high temperatures.

Important in temperature control is the balancing of the increased solids you may get against deleterious solids and volatility of preferred flavors at the elevated temperatures.

Pressure Within System

Briefly, it might be stated that any increase in pressure should result in less volatility of aromatic constituents. Of course, this is primarily true for hypothetically ideal conditions where constituent concentration in the vapor phase is inversely proportional to the pressure of the system.

Operating pressures in the extractor system are usually in the range of 30-50 psig. Solids content of an extract to be dried depends on many factors, as has been discussed. However, the general practice in *pure* soluble coffee manufacture is to work in the range of approximately 32-38% solids for drying purposes. But this is not a hard and fast rule. Rather, it depends on what happens during the drying cycle as well as the type of finished particle that is required.

Rate of extraction is controlled, in part, by the rate of diffusion of the solute (or solid) to the interface between phases. Particle size, or grind, is important, since the soluble material travels through a distance that is certainly dependent on the extent of subdivision of the solid particles. However, there are practical limitations in commercial soluble coffee extractions with respect to the use of ultrafine particles. In most instances, particles smaller than 20 mesh will result in abnormal pressure drops in the system due to channeling and/or packing.

One method that might possibly obviate the necessity for using large particles is production of "flaked" coffee. This is a particle of large diameter but extremely low thickness, roughly 0.007 in., which results in a decrease in the diffusion distance of the solute through the solid.

Time of Extraction

Rate of extraction, all other factors being constant, is dependent on time of extraction. Here again, as with temperature, it is important to balance increased solids against deleterious solids. Although different manufacturers employ different times, average contact between liquid and ground coffee in each percolator should be 60-90 min.

Whether or not the final extract coming from the extractors is clarified prior to drying will depend on two things: (1) Extent to which fine particles of ground coffee have been removed prior to extraction, and (2) decision of the manufacturer regarding consumer reaction to possible sedimentation in the finished cup.

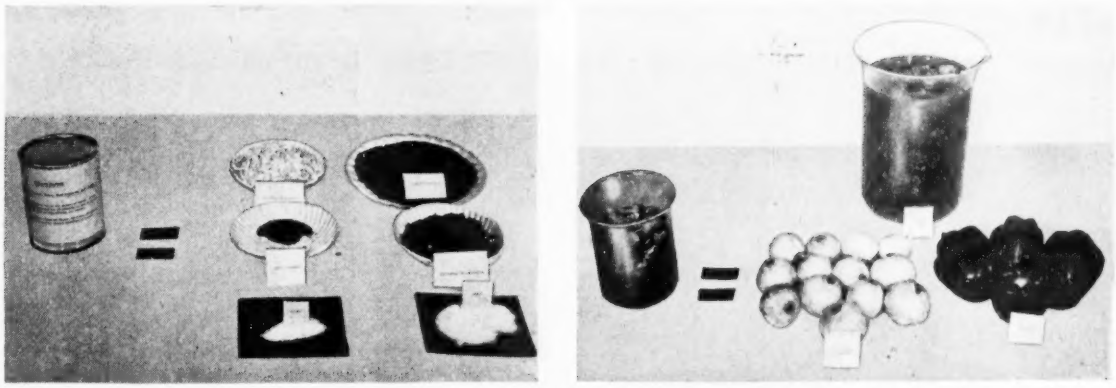
It is my opinion that one cannot completely eliminate sediment. It is only possible to reduce its concentration. There are two standard methods of accomplishing this and, from the writer's experience, they are equally effective. The choice is between using a centrifuge or a filter press.

The former represents a much greater initial investment but results, under normal conditions, in practically continuous operation. The filter press costs much less but requires cleaning several times during its daily operation. If manpower is readily available and keeping the initial costs to a minimum is a prime factor, it is my recommendation that the filter press be used.

A filter aid is of great help at this point. A small amount is mixed with the liquid to be filtered, and this extract is recirculated through the press until the asbestos sheets are coated with filter aid. Then the mass of extract is filtered.

When an extractor is removed from

(*Turn to page 168*)



PREMIX saves weight, cargo space, refrigeration, cooking time. Dry ingredients (left) go in No. 2½ can. They are made from canned and fresh vegetables of about 10 times the weight and filling 10 times the space (right).

"Dehyd. Veg. Mix"—3-Way Saver

Made to Navy formula, tomato-sauce premix cuts (1) space, (2) weight, and (3) preparation time. And dishes turned out with it are rated as tasting "as good or better"

RICHARD R. BARTON
and LEONARD TRAUBERMAN

Commissiary Research Division, U. S. Naval Supply Research & Development Facility, Bayonne, N. J.

Navy's dehydrated tomato-type vegetable sauce premix, prepared to a single formula, has won taste-panel acceptability when cooked in many of the service's 40-odd recipes, which include similar ingredients, though in varying proportions. Taste tests were carried out by feeding Navy Servicemen.

Obviously, recipe errors are minimized when a single ingredient mixture is employed. Further, the cook's time is conserved.

The mix is prepared from commercial ingredients. Dehydrated vegetables and flavoring materials employed are in these proportions:

Component	Weight (Grams)	Percent
Tomato flake	250	63.50
Dehydrated onion	64	16.21
Dehydrated sweet pepper	32	8.12
Salt	36	9.13
Sugar	8	2.03
Chili powder	4	1.01

Above quantity of premix can be packed in a No. 2½ (401 by 411) can, for easy handling and storage and to avoid preparation errors.

How Time is Saved

Estimated time saved, using mix as compared to preparing the equivalent from canned and fresh vegetables, is approximately 90%.

This is not the only time saving. Cook's preparation of dish is speeded, and period frequently required for boiling down and evaporating can be avoided by adding less water when reconstituting the dehydrated premix in preparation of a sauce.

Space and Weight Savings

As can readily be observed in the comparisons noted above, the premix weighs only 9.5% as much as canned and fresh ingredients and occupies but 10.2% of the space. Here is weight and ingredient table for 24 gal. of sauce:

Weights	Premix	Canned & Fresh Ingredients
Net weight	21 lb.	
Gross weight	33 lb. 8 oz.	347 lb. 8 oz.
Volume	1.1 cu. ft.	10.81 cu. ft.

Very important is the fact that space in refrigerated holding rooms, required for fresh onions and peppers, is made available for storage of other perishable foods when dry mix is used.

Premix contained in a No. 2½ can makes 1 gal. of sauce material when reconstituted. Sauce prepared in this convenient unit simplifies ration calculation and measurement; also conserves preparation and cooking time and reduces errors.

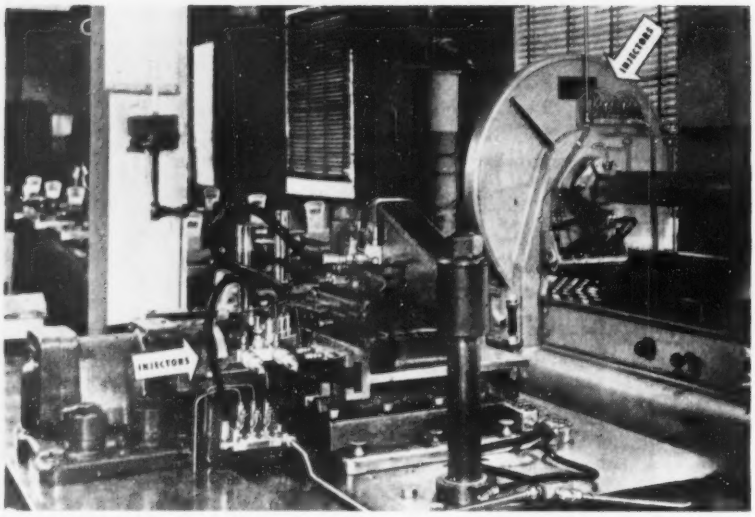
Stability Tests

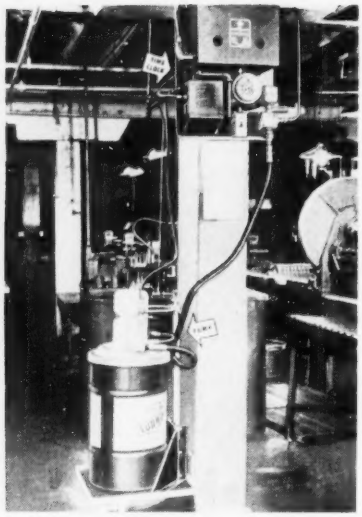
Samples of the tomato premix were stored at room temperature and also at 100 deg. F. to ascertain storage characteristics of premix. Samples were examined organoleptically after two, four, and six months' storage.

At the end of the two and four months' periods, there was very little change in the appearance or flavor of the premix, whether stored at room temperature or at 100 deg. F.

After six months' storage, the room temperature samples were unchanged. However, samples stored at 100 deg. F. darkened slightly. Nevertheless, when latter samples were used in recipe preparation the resultant products were quite acceptable even though their color was slightly darker.

MEAT





PRESSES, SLICERS, CONVEYORS: Formerly in this meat plant, machines had to be shut down for 1 hr. every day for lubrication. With new system, 18 bearings on each of 4 bacon presses, 11 on each of 4 slicers and all bearings on conveyors are serviced simultaneously. Shut-downs are eliminated. Lubricant consumption is cut in half.

CENTRALIZED LUBRICATION

Increased output, savings in labor and lubricant used, as well as lower

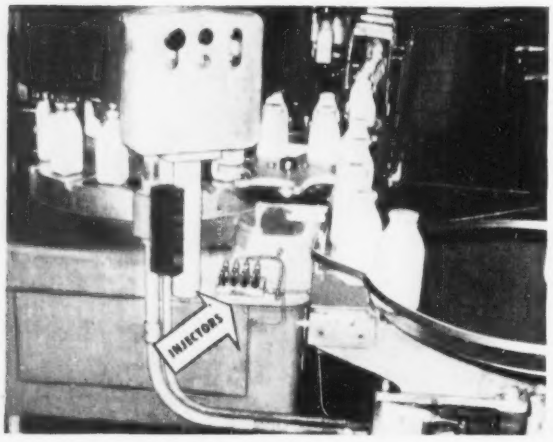
L. C. ROTTER
Chief Engineer, Lincoln Engineering Co., St. Louis, Mo.

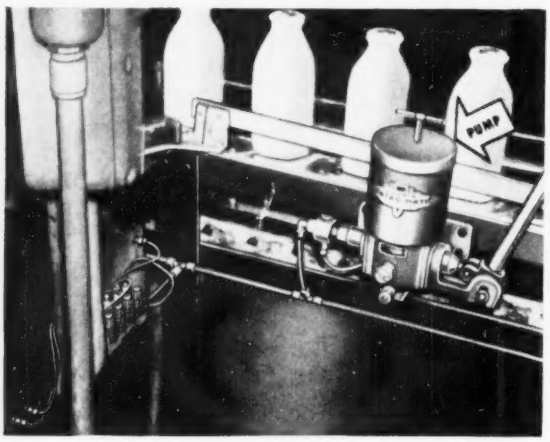
Increased production and lowered operating costs are gained through use of centralized lubrication systems. This is true regardless of the product—meat, bread, milk, beer—or the machines—presses, slicers, fillers, wrappers—involved.

Good lubrication depends on more than just the lubricant employed. The finest quality oil or grease can be a complete failure in service, if it is not properly applied. In many instances, the lubricant manufacturer is the victim of unjust condemnation for mechanical failures, when the real responsibility may lie with the method of application, or at the door of the machine operator.

It is a time-worn axiom that perfect lubrication depends on a method that will assure the application of the **right lubricant**, in the **right quantity**, and at the **right time**. Obviously, the human

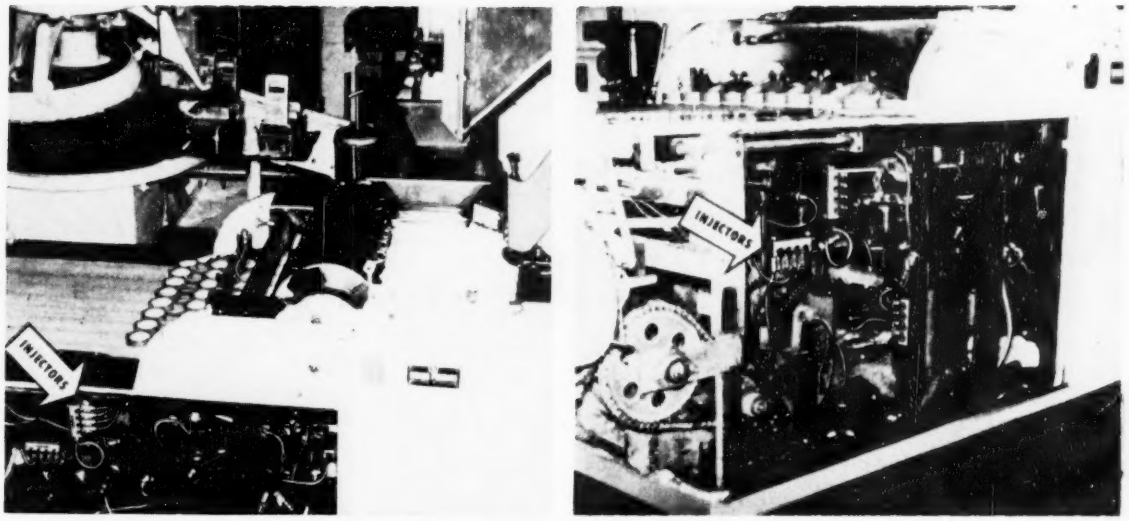
MILK





CAPPERS: In this dairy, 7 vital bearings on each of 3 capping machines are serviced from a centralized system. Inadequacy of former manual method of lubrication resulted in shut-downs due to caps sticking. New system not only solved this problem but increased output 1,440 units per 8-hr. shift.

BREAD



BUN MACHINE: Can and gun lubricating method in this bakery required 1½ hr. daily and stopped production during application. Now, centralized system comprised of manually operated pump and injectors services 69 bearings simultaneously. Production time increased 1½ hr. per day. Contamination from excessive lubrication is eliminated.

CUTS PRODUCTION COSTS

replacement machine-part costs, are benefits of controlled lubrication

element, as represented by an oiler with can or grease gun, cannot always be relied upon to dispense the right quantity of lubricant at the right time.

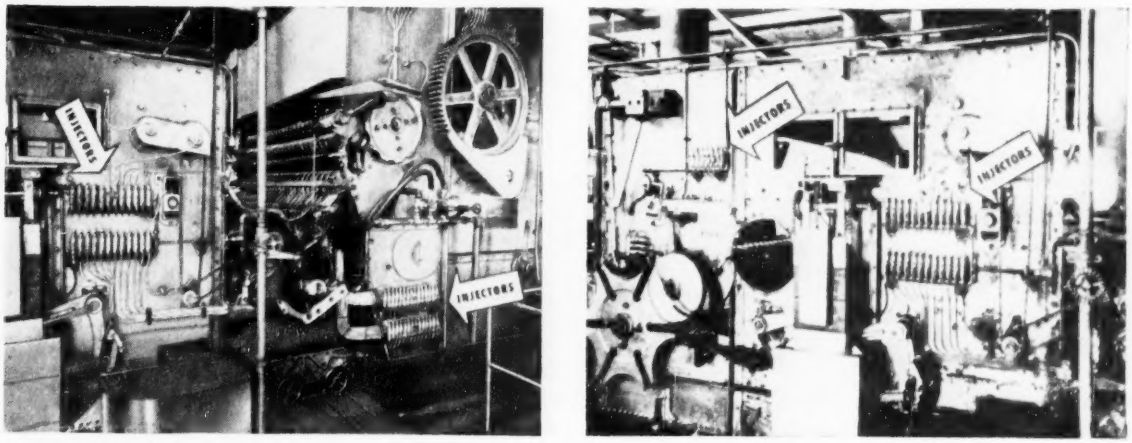
The inadequacy of the can and gun to meet the more precise lubrication requirements of today's machines rests on the fact that this method provides no elements of control.

One can only assume that—(1) the right lubricant has been selected in the instance of every bearing; (2) every bearing will be located and contacted; (3) the proper amount of lubricant will be applied to each bearing; (4) lubricant will be applied at the proper time intervals; (5) as applied, lubricant will flow to the bearing; and finally (6), the lubricant will be free of contamination.

Aside from lacking the required elements of control, the cost of the can and gun is threefold: (1) Initial, (2) carrying them around; and (3) the consequences resulting from the way they are used.

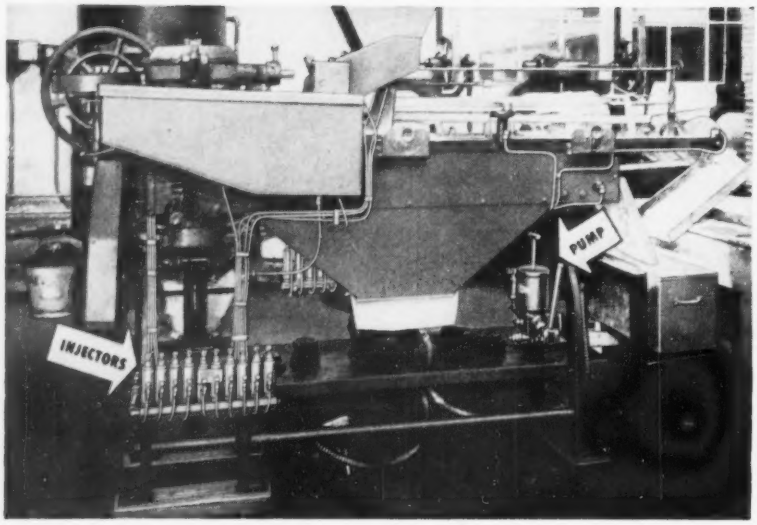
Bearing failure due to improper lubrication—which is either applica-

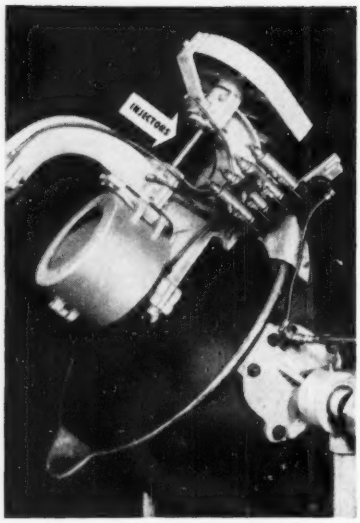
BEER



BOTTLE WASHERS: Under old method in this brewery, 18 oilers (1 per washer) used 2 hr. every 2 days to lubricate 250 bearings on each of these machines. New system freed 12 oilers for other duties. Down time for lubrication is eliminated, bearing failures reduced and output per washer increased.

CANDY





CUTTERS, SIZERS, COOKERS: Previously, machines in this candy plant were equipped with grease fittings and oil cups which were manually serviced at regular intervals by a lubrication crew. With new system, labor costs are down 80 percent, lubrication used cut 30 percent. Output of machines is increased and cleanliness completely eliminates contamination of products from dripping of excess grease. System on each machine includes one manually operated pump and injectors servicing up to 46 bearings simultaneously.

tion of insufficient, excessive or contaminated lubricant—results from slow cumulative wear.

The process of deterioration cannot be readily detected from observation, nor controlled by an exacting choice of lubricant, or the most rigid instructions as to lubrication.

In contrast to manual lubrication methods, let us consider the degree of "control" provided by modern centralized systems. Stated in simplest terms, the centralized system comprises a lubricant pump and a series of measuring valves, or injectors. And there is positive cycling of all valves in an entire system, at predetermined time intervals, to insure the application of a measured amount of lubricant to each bearing under positive pressure.

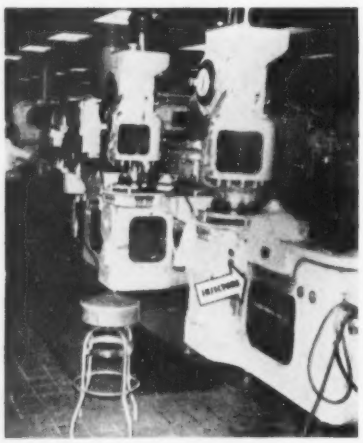
Automatic Cycling

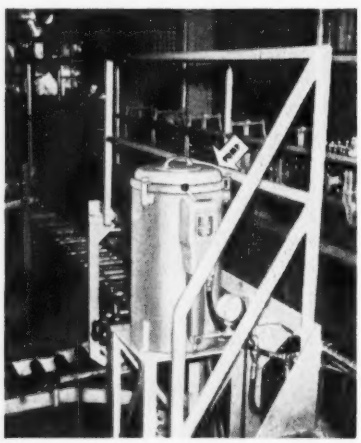
The pumping unit may be electrically, pneumatically, hydraulically, or manually operated. And it delivers lubricant from either an original refinery container, an independent reservoir (as in the case of certain hydraulic units), or from a self-contained reservoir.

Power-operated pumps can be provided with time clocks to automatically control the time interval of the lubrication cycle.

Lubricant is forced from the pump through a supply line to the injector valves, usually mounted on the machine in manifolds from which rigid or flexible feeder lines extend to each bearing. Each injector is equipped with a visible indicator and an external manual adjustment to insure the proper application of lubricant.

SOFT DRINKS





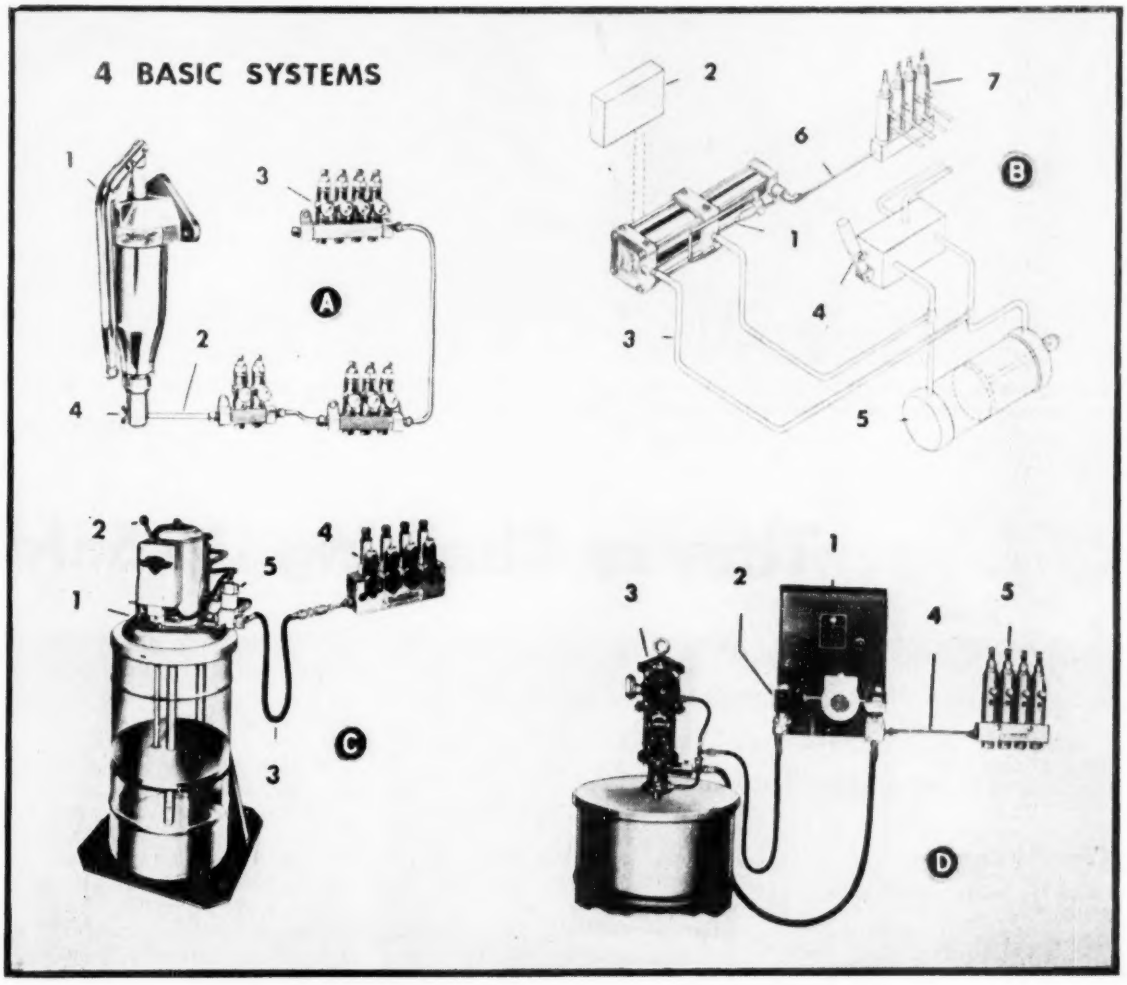
WASHERS, FILLERS, CASERS, CONVEYORS: Prior to installation of central system in this bottling plant, two men were required to report to work 1 hr. early to lubricate machines and still bearing failures continued to occur. Centralized systems now in operation service up to 128 bearings on 4 fillers; 288 bearings on 4 case feeders and packers; and 173 bearings on loading tables, uncasers and conveyors. Bearing failures have disappeared, and machines now run smoothly, minimizing bottle breakage.

Thus, it is obvious how centralized systems can provide the greatest degree of control over application. For example:

1. Injection of the right lubricant into all bearings served by a centralized system is assured once it has been selected.

2. Knowledge of the lubricant capacity of a bearing need not rely upon mathematical or theoretical calculations.

With the displacement adjustment of the injector valve, capacity can be determined. (*Turn to page 140*)



FOUR TYPES OF CENTRALIZED LUBRICATING SYSTEMS

A. Manually Controlled–Manually Timed: Lubricant is forced under pressure on up stroke of pump (1), through supply line (2) to lubricant injectors (3). Continued stroking of pump is required until cycle indicator (4) on pump protrudes, signalling completion of cycle. Releasing of pump handle automatically vents pressure in supply line, permitting injectors to recharge.

B. Automatically Controlled – Timed by Hydraulic Control: Hydraulically operated pump (1) and lubricant reservoir (2) are mounted directly on machine to be serviced. Pump is connected by means of hydraulic fluid lines (3) to four-way hydraulic control valve (4) on machine. Operation of this valve actuates double-acting movement cylinder (5) which directs action of machine, and simultaneously energizes reciprocating action in lubricant pump. Action of pump forces lubricant under pressure through supply line (6) to injectors (7). On completion of lubrication cycle, vent valve on pump relieves supply pressure, permitting injectors to recharge for next cycle.

C. Automatically Controlled–Manually Timed: Pump (1) is operated to cycle system by moving control handle (2) to "start" position which admits air to pump. Lubricant under pressure from pump passes through supply line (3) to injectors (4). After completion of cycle, control handle is automatically returned to "off" position by a vent valve (5), which also vents supply line pressure, permitting injectors to recharge.

D. Automatically Controlled–Automatically Timed: Predetermined frequency of lubrication cycle is set on adjustable time clock (1). Cycle is automatically started by closing electrical circuit in relay switch on time clock panel. Clock automatically energizes solenoid air valve (2), permitting air supply to pass to air-motor of pump (3). Lubricant, under pressure, is dispensed through supply line (4), discharging injectors (5) at line pressure. Injectors automatically recharge when pressure is relieved in supply line; completing lubrication cycle.

WELL EARNED. C&B President Menzies receives safety award from Liberty Mutual Regional Manager Fox (left). Food company's Safety Director Ott, author of this article, is seated beside insurance official.

They're Chalking Up Safe

Disability injuries are "zeroed" by sharp-eyed performance of Baltimore firm's special employee team. Man who "calls signals" details what makes award-winning system work

ALBERT B. OTT

Safety Director, The Crosse & Blackwell Co., Baltimore, Md.

Nearly 1,600,000 man-hours worked without a disabling injury during the '52-'53 period! That's the achievement of our employees at Crosse & Blackwell, processor of jams, marmalades, pickles, and vinegars.

When we passed the million mark, we received an Award of Merit from our insurance company. And last year we were given the Award of Honor of the National Safety Council, finishing second in the Food Processing Division. The City of Baltimore has also honored us for safety.

These honors are not our first. We have previously won many others from national and local councils. Here are a few examples of our safety achievements: One of our large, busy departments has worked six years without a disabling injury. . . The C&B laboratory has a 12-year record in this respect. . . And our printing department's record for freedom from disabling injuries is particularly outstanding—no accidents during its 26 years of operation.

For the benefit of others interested in safety, we gladly take this opportunity to pass along pointers on how our program functions:

Starts at Top

Employee safety is an important and continuing program at our company, as evidenced by the fact that it stems from the top. President John T. Menzies, has clearly set forth the overall objectives and, with that start, specific duties and responsibilities have been assigned. These rest not only on the personnel department but flow through to departmental management, supervisors, and all employees. As a result, all concerned are impressed with the leading role played by our safety program.

In the plant, our factory manager is —to use football terminology—the coach. And we, in personnel, call the signals by directing the operation of the safety committee. We keep the records, analyze accidents, and endeavor in every way to keep everyone constantly acquainted with the need for safety.

Membership on our safety committee is by invitation. This group includes foremen, foreladies, plant and office employees and union stewards. We try to select members who are safety conscious, and we expect them to do a selling job in turn. Naturally, the aim is for a fully representative cross-section membership. Meeting times and membership rotation is not fixed to any rigid schedule. Thus, we avoid the aspect of committee membership being a burden.

Returning to football terminology, the committee members form the backfield of our team. When a safety recommendation is passed to them it becomes their job to carry the ball. Here, we are fortunate in having the best of team spirit. Safety is always a discussion subject at the daily production meetings held by the plant manager and attended by all supervisory personnel. This is a particularly valuable part of our accident-prevention efforts, since these meetings are concerned with the day-by-day phases of plant operation.

One of our very real safety problems relates to temporary employees needed for seasonal work. To acquaint such employees with the need for safety at

all times, we use a slide film produced jointly by our insurance company and our personnel department. The film is shown to individuals, or to groups, depending on the hiring activity. Thus, new employees come to realize the stress we put on safety. And by this means they become acquainted with the hazards of the department in which they will be employed.

When new employees are taken to their departments, they are given further safety training by the department supervisor or foreman. We use the Job Instruction Training System since it is simple, fast, and effective. The employee is told what his job is, shown how it is done, and then does the job himself. The supervisor checks back periodically to see that the task is being performed correctly and safely.

Barrels Minus the Hairnets

To supplement the film, slides in color will be used in the near future. These will be arranged by jobs and edited so that a man hired to handle barrels will not have to sit through pictures explaining why our women employees must wear hairnets.

Safety suggestions are initiated by our supervisory personnel and forwarded on a special form to the personnel department. By means of copies, the production manager and all departments involved are acquainted with the suggestion. One copy remains in the personnel department for follow-up once the suggestion has been discussed and adopted.

Each week the safety posters throughout the plant are changed. We use a number of homemade posters, photographs and, of course, material from the National Safety Council. We think that a frequent change of these posters is important to maintain interest.

Both proper training of employees and safe working conditions are important. We expect constant observation, particularly on the part of our supervisory personnel and safety committee members, to spot new or potential accident hazards. This supplements regular plant inspection by the personnel manager and safety engineers from our insurance company.

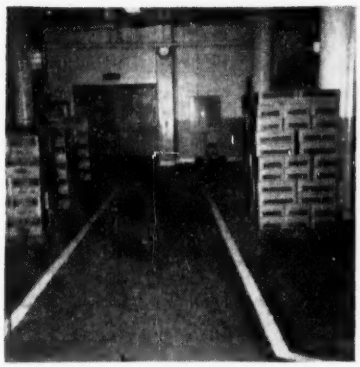
Sanitation is an integral part of our safety program and as such is married into all safety activity. When a new operation is being set up in our plant, it is always viewed from the safety angle as well as the production side. To outline our approach, we always make certain that all cooking vessels are covered by hoods to keep the atmosphere free of steam.

A matter as simple as the location of valve handles is considered in the prevention of burns. If platforms are required, we see that these are not of a temporary nature and that hand rails are erected wherever necessary. If tanks are involved, we consider the possible overflow of hot materials and make

(*Turn to page 176*)

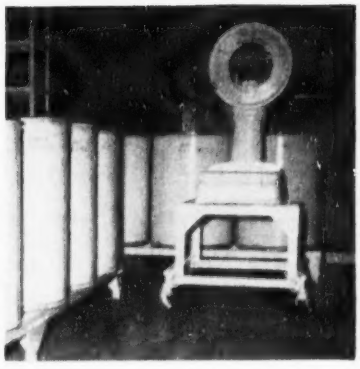
Man-Hours *by the Millions*

HERE'S HOW

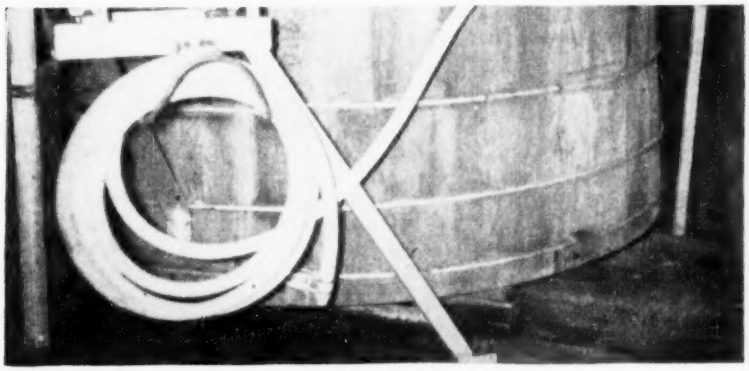


AISLEWAYS are clearly marked for safety. This speeds traffic, too.

TRUCK'S top-caging protects operator against falling objects.



SCALES are mounted on casters to ease handling, avert mishaps.



HOSE properly coiled and racked after use prevents tripping accidents. Further, removal from floor to specially designed metal hanger improves sanitation, extends life of hose.

HOPPER of grinder has protective grille to keep fingers out of machine. Note pointed safety signs.

SET UP FOR SUPPLY. Loaded trailers are tractored into branch yard and spotted along rim of area. Thus there's ample space for route trucks to maneuver to units, load up rapidly and efficiently, and depart.

Profitable Innovation—

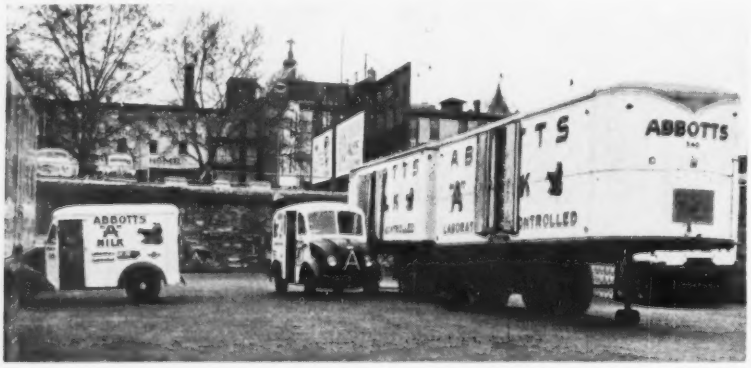
"Warehouse on Wheels"

Transformed by special engineering, capacious trailers become handy, mobile supply units. And thus Philadelphia dairy zooms efficiency in serving its route trucks, saves operating dollars

IVAN C. MILLER
Associate Editor, "Food Engineering"

Stepped-up efficiency has resulted since Abbotts Dairies, Inc., Philadelphia, introduced a mobile warehouse system for loading and unloading route delivery trucks. Here are the benefits that make this a profitable system:

1. **Lowered capital investment**
2. **Elimination of the need for branch plants in certain areas**
3. **Reduced operating costs**
4. **Accelerated loading and unloading of route trucks**



And this is how the mobile warehouse system is operated to produce these benefits:

Adequately insulated truck-trailers, 30-33 ft. in length, each equipped with a contained mechanical refrigeration system, are loaded at the central plant with fluid milk, cream, and other retail route products. Filling of each trailer at the central plant is in accordance with next day's orders that have been entered by driver-salesmen.

When loaded, trailers are driven to the loading center, a paved yard adjacent to the garage that houses route trucks. Here trailers are parked around the side of the lot, where electric-circuit leads are stationed at convenient

AFTER UNLOADING, mobile warehouses are lined up in center of yard to receive empty cases from returning route trucks. This opens side spots for incoming filled trailers.

intervals for servicing the motors.

As soon as one trailer is spotted, tractor returns to bottling plant with an empty trailer and again picks up another full one. Meanwhile, electric cables are connected to motor trailer refrigeration compressor to maintain a safe temperature level.

Loading of route trucks from trailers is similar to filling from a plant loading dock. However, a major advantage has been gained by loading from the vehicles. Distance between doors of a series of trailers is greater than that between doors serving a conventional loading dock. Thus, route trucks have much more maneuvering space for approach and get-away, time spent at the lot is cut, and accordingly time for route delivery and sales effort is extended.

When trailers are employed as mobile branch warehouses, refrigerated storage requirement at the producing plant is reduced. Trailers can be loaded directly from processing lines with minimum materials handling. And their refrigeration capacity is adequate to maintain steady low and safe temperature.

Trailer Engineered for Job

Although the system operates smoothly and seems quite simple, arriving at the level of dependable performance involved many engineered changes in trailers to convert them to suitable refrigerated storage warehouses.

It was deemed necessary in the beginning to rebuild the bodies selected for storage units. Specifications established were rigid. All wood members of the vehicle proper were replaced with aluminum construction. Same metal is also employed for inside and outside surfaces of sides and top. Laps and joints of sides, lining, and top are thoroughly sealed to prevent any moisture reaching the insulation to impair its efficiency.

Between the metal layers, asphaltum is applied to the 4-in. insulation to hold it firmly in place under the heavy jars and jolts of road use, and also to seal space between the blocks of insulation.

Very important to efficient performance is the floor of the trailer, where liquid will frequently collect. Latter must be prevented from reaching either the insulation or the under-parts of the vehicle to rot truck-bed support-beams.

The floors, which are made of stainless steel with welded joints, are flanged up at ends and sides to form a 6-8 in. deep, water-tight pan, except at the doors, where the steel is flanged down. Escape of water at doors or corner drains does no injury to understructure.

Refrigeration Made Dependable

Each trailer is equipped with both gasoline and electric power for operation of its refrigeration compressors. Some of these are mounted in an insulated compartment at floor level in the front end. In other designs, the compressor is suspended in a compartment beneath the body. In both cases, refrigeration assemblies are heavy-duty units, mostly of the stationary type normally used for plant service. And they are located where they are readily accessible for maintenance and repairs.

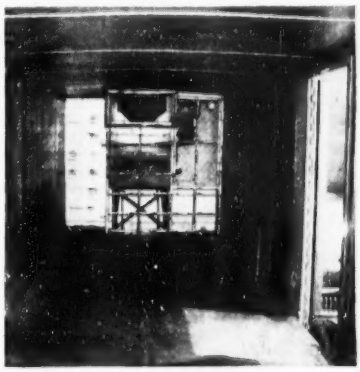
Refrigeration effect is obtained by circulation of cold air from a plant-type unit-cooler, located in one end of the trailer. Cooler, which also is the same efficient stationary type used in plants, is compact, occupying very little pay-load space.

One other feature adds measurably to loading and unloading efficiency: Spotlights are located at both ends inside the body. Even when unit is fully loaded with cases, the light reflected from the polished aluminum ceiling is ample for night operators.

A trailer constructed to Abbotts' high specifications is by no means a cheap job, dollar-wise. However, from an operating standpoint, the investment is economical.

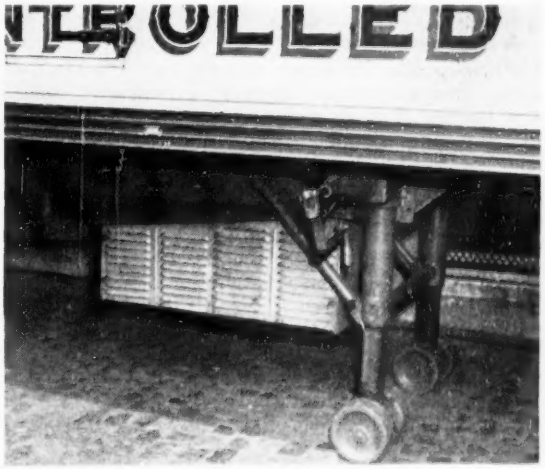
For the all-aluminum construction soon pays for itself in increased pay-load. And adequate insulation, expertly applied, maintains temperature with minimum power and maintenance cost, avoiding product loss throughout a long life of service.

Likewise, investment in water-tight steel for floors is soon amortized by reduced chassis replacement and repair, as well as by preservation of insulation at the flow-level points where it is most susceptible to serious damage from moisture.

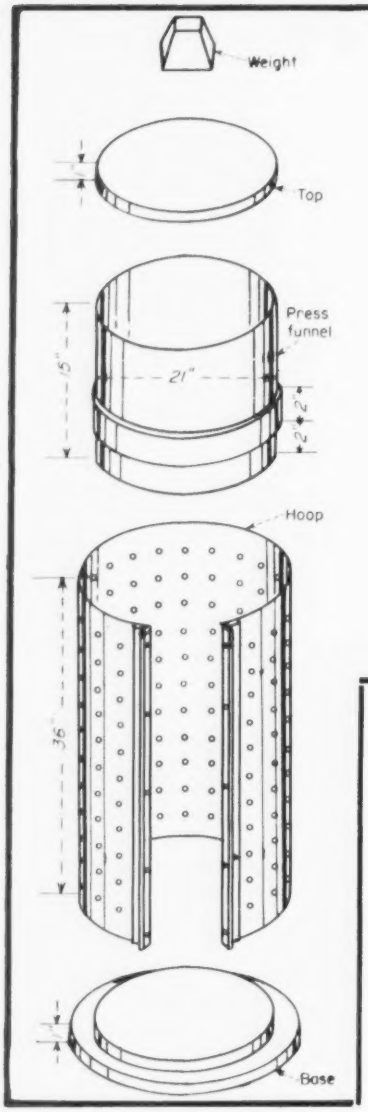


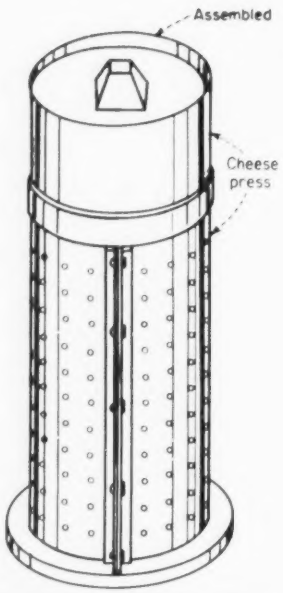
COOLER of plant type provides uniform temperatures within trailer.

EACH TRAILER is refrigerated either by a gasoline engine driven compressor (visible within door on right) or electric drive unit (seen inside door on left).

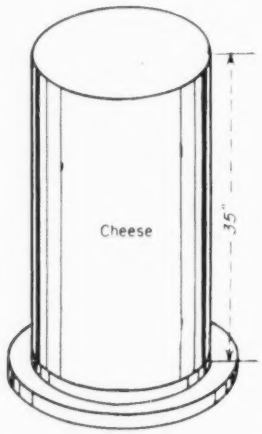


COMPRESSORS are readily accessible for repairs, whether mounted under trailer (as above) or within body end (as already noted in last photo).





How It Works



NEW PRESS AND TECHNIQUE. Disassembled view (left): Base is made of wood disks covered with stainless steel sheet. Hoop is standard stainless sheet rolled into a cylinder with ends fastened to angle irons. Press funnel

ENGINEERED PRESS

Simplifies Cheese Handling

New design now vastly eases chore of pressing, curing, moving the ponderous heavyweight cheddars

R. R. HAUGH
Engineer, QM Food & Container Institute for the Armed Forces, Chicago

When cheddar blocks are used for making processed cheese there is a large amount of waste caused by the need for hand trimming. And naturally, the smaller the size of blocks the greater the accumulated waste.

Hence, to reduce trim waste, and also mechanize the operation, the cheese-makers have recently gone to mammoth blocks of product weighing as much as a half-ton each.

But the ponderous size of these huge cheddars poses tough handling problems that have threatened to severely hobble the intended gains.

For one thing, the sides of conventional stainless-steel pressing boxes bulge during operations, and cost of reinforcing or replacing these is high. Also, a cheap but strongly made plywood box is required to hold the giant cheeses during months in the curing cooler, and to be economical these must withstand knock-down and reshipment again and again.

Finally, great difficulty has been encountered due to the slow and uneven cooling of the huge blocks. After excess whey is pressed out, the blocks leave the make-room for the cooler at an approximately uniform 92 deg. F. But with a mammoth encased in its insulated container it is impossible to reach and maintain a uniform heat-exchange from surface to center during cooling, hence uneven cure and non-uniform moisture content results.

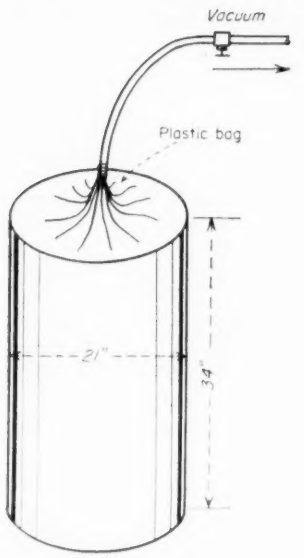
New Way and Benefits

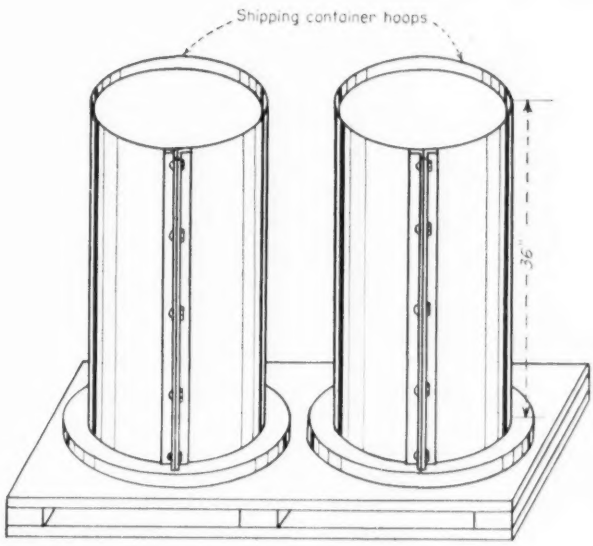
To overcome these difficulties a new all-metal cylindrical press and retaining hoop have been designed. Not only has this assembly proven more rugged, but its circular construction—

- **provides a "cylindrical" block in large size that minimizes trimming.**
- **reduces and improves cooling due to equidistance of center of the cheese from its outside.**
- **permits a uniform palletizing, which vastly reduces labor and handling operations.**
- **affords a telescoping compactness in returning hoops to the cheese plant.**

Design of the new assembly is revealed in our accompaning detailed drawing. Essentially, the press unit—which is all stainless steel and easily knocked-down—forms a uniform cylinder of cheese, which is then either paraffined or vacuum bagged for retention in a similarly sized metal hoop for curing and shipment.

Not shown in the drawings are a



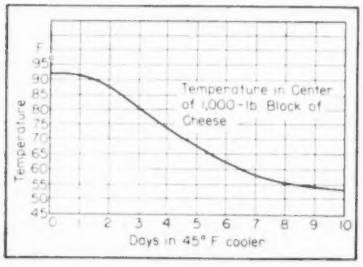


is of heavy stainless with a 2-in. retaining ring to fit into hoop. As illustrated in subsequent drawings, whole press cloth that is placed in the hoop and turned over the top edge before the press funnel is located. Also $\frac{1}{8}$ in. drain holes for the pressed out whey are located in the bottom of the press base.

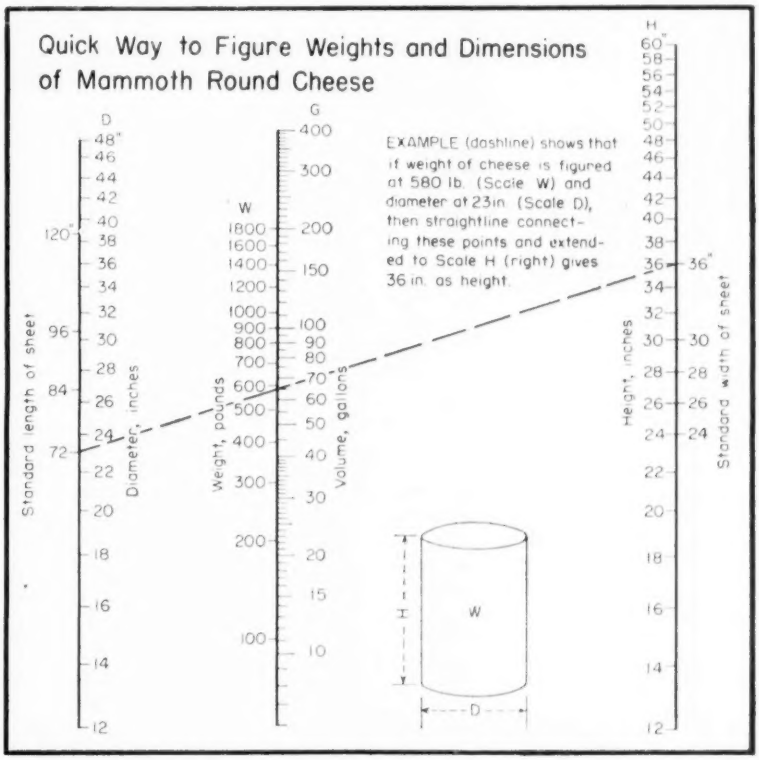
The base upon which the pressed cheese is placed for hooping merely consists of two concentric pieces of wood fastened together. The retaining hoop, made of inexpensive sheet metal, clamps around this base and the cheese to hold the latter in shape while it is being cured and during shipment.

Two of these cylinder blocks can be placed on a standard wooden pallet, and this can then be easily moved into the cooler for aging. Similarly, lift trucks can be employed for moving the huge cheddars to shipment and in the processing plant.

assembly is filled with cheese curd, then top and weight is put on to force whey through small holes. After setting, press is removed and cheese is put in plastic bag for vacuum sealing. Cheese goes back in hoop to age.

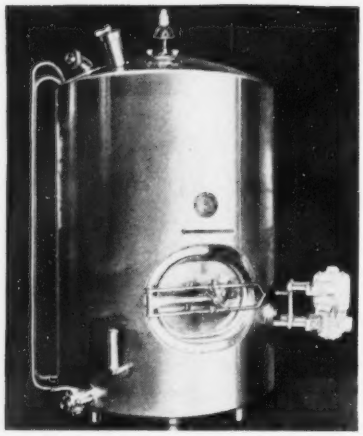


COOLING RATE of 1,000-lb. cheddar in 45 deg. F. cooler is slow and not conducive to even cure and uniform moisture control.

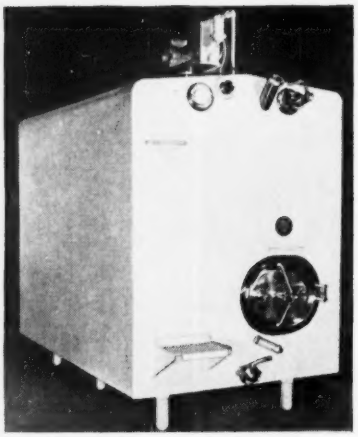

Quick Way to Figure Weights and Dimensions of Mammoth Round Cheese
D
G
W
H
EXAMPLE (dashline) shows that if weight of cheese is figured at 580 lb. (Scale W) and diameter at 23in. (Scale D), then straightline connecting these points and extended to Scale H (right) gives 36 in. as height.
Standard length of sheet
Diameter, inches
Weight, pounds
Volume, gallons
Height, inches
Standard width of sheet

CALCULATING press size for cheese blocks—100 to 1,800 lb.—is easy with this handy nomograph. How to do it: Weight of cheese is spotted on scale W and its diameter on scale D. Then straightline through these points cuts scale H to give needed height. Knowing any two of these dimensions, the third can be found. Scale G gives gallonage. To avoid sheet-metal waste in hoop design, scales of standard sheet lengths and widths are included. Thus cheesemaker can figure sizes suitable for standard sheeting for hoops.

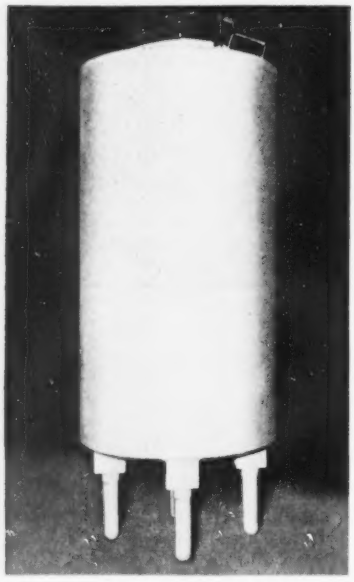
HORIZONTAL single-shell sanitary storage tank, 5,000 gal. capacity.



VERTICAL insulated unit with agitator is ideal surge tank.



CUBICAL holding vessel fits many layout schemes, has air agitation.



HIGH-PRESSURE cylindrical tank even handles "atomic" liquids.

Better Tanks Speed

Engineering advances the versatility of sanitary vessels. Besides routine storage, modern stainless tanks offer these advantages:

- Surge capacity to balance fast-paced operations.
- Versatile blending, mixing, agitating service.
- Rapid heating or cooling of product in process.

JOHN T. WINSLOW

Product Sales Manager, Cherry-Burrell Corp., Chicago

It's time for the processor to take another look at what were commonly called "storage tanks." In a new guise as "process vessels," these units can well bring economy, efficiency, and capacity to a floundering continuous processing system.

Several so-called evolutionary changes add up to today's versatile stainless steel tanks.

For one thing, there is the improvement in stainless steel itself. Better, more resistant types have been developed, and experience in working, forming, and welding have reduced sheet gages and construction costs. And electroplating has brought fine, smooth surfaces at a fraction of the expense of former buffing methods.

Upshot of the above is the availability of top-notch sanitary design and durability in equipment which can replace less satisfactory food handling vessels at very little added cost.

Another significant change in modern tanks has been the development of a double-skin, or jacketed, heat-transfer surface. Modern fabrication techniques made it possible for the actual liquid contact surface in the tank—the inner lining—to be a means of heat-transfer. The heating or cooling medium, moving in curved channels around the outside of this surface, effects direct wall-to-product transfer.

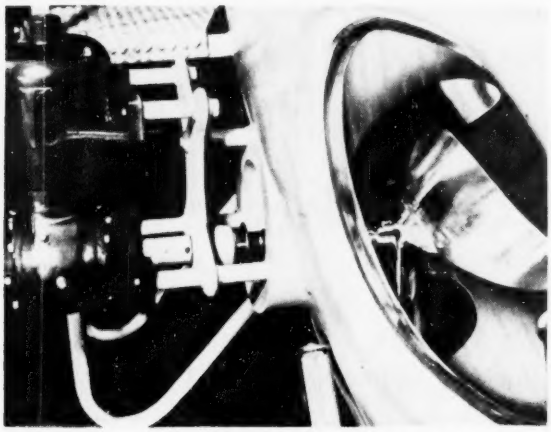
Many advantages have accrued through this method of enclosed heating or cooling in tanks. Medium passageways can be strong enough to actually stand ASME unfired-pressure-vessel tests, yet are applied at low cost through continuous welding techniques. This affords absolute safety from product contamination, yet provides a higher rate of heat-transfer through greater pressure and velocity of the heating or cooling medium.

Other inherent benefits favor tank heat-transfer design. Application of heat to a flat-sheet transfer surface does not interfere with the manufacture of cubical, conical, or spherical containers. Therefore it allows a wide variety of shapes. Flexibility in laying out the manifold permits precise control of cooling or heating media for optiumum heat transfer in any given application.

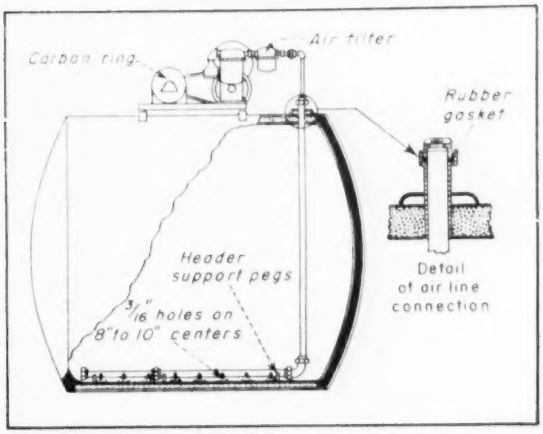
The short free-flow passageways are suited to direct-expansion refrigerant cooling as well as heating by steam condensation. These multiple passageways also are arranged in series to create circuited flow and thus permit high-velocity heating or cooling with liquids.

Aside from purely structural advantages, however, the use of tank heaters and coolers can fit in well with many a production scheme where continuous heat-exchangers would be untenable. For example, automatically controlled in-tank heating or cooling can take place in off-hours, saving time and labor. Further, "surge" heating or cooling may allow speed-up of subsequent processing operations.

Then again, by spreading the heat-transfer process over a longer time,



SLOW-SPEED propeller with large curved blades enters vessel through sanitary rotary seal.



AIR-AGITATION system effectively mixes or stirs tank contents, yet treats product gently.

Processing

demand on the heating or cooling supply system is evened out and peak load reduced.

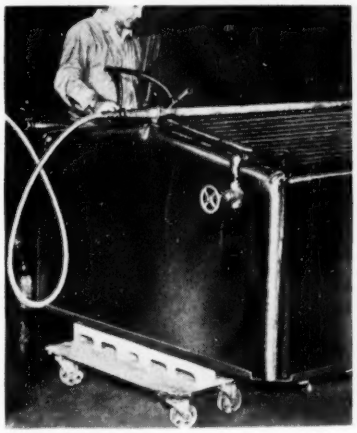
An important adjunct in the improvement of heat-transfer as well as in mixing, blending, and maintaining product homogeneity has been the addition of agitating members to tank vessels.

Early agitators for food process tanks were primarily the light portable beaters which clamped externally and induced product movement in a small local area. However, today's agitators are permanently mounted, all stainless-steel, and employ large slow-speed propellers which move all tank liquid gently, yet thoroughly, without whipping or beating.

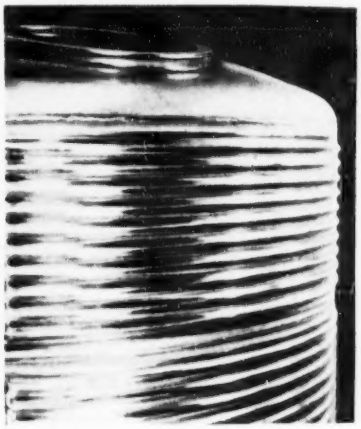
Another basic improvement in propellor agitators has been the replacement of packing glands with compact and highly sanitary rotary seals which can be disassembled for cleaning.

A current development which appears to hold even greater promise than mechanical agitators is the use of compressed air for this function. A small, specially designed compressor with non-lubricated cylinders pumps air through suitable distributing pipes in the tank. Movement of the bubbles through these pipes creates an excellent gentle mixing or agitating effect. In applications where oxygen is harmful, inert gas has been used in bubble agitation.

It is apparent that a triple combination of sanitary capacity, plus heat transfer surface, plus agitation, should be able to solve many problems which have come up in continuous food manufacture.



HYDRAULIC test assures that welded passageways meet ASME "specs."



WELDED channels permit high velocity, pressure for fast heat transfer.

For example, the modern process tank can mix or blend ingredients at any specific temperature — within a wide range — and with little danger of component separation. Further, viscosity of the liquid can be increased or decreased as required. And precipitation, crystallization, germination, or absorption rates can be accelerated or retarded through judicious control of cooling or heating, with or without agitation.

In addition to their widespread use in dairy manufacture, process tanks now are used in these operations: (1) To blend and pre-heat vegetable oil products, such as margarine and dairy desserts; (2) To formulate and hold liquid candy mixes, such as marshmallow syrup: (3) To provide surge and preheating capacity in continuous baby food sterilizing lines: (4) To mix, blend, and preheat liquid and semi-liquid meat products prior to canning.

One excellent multi-function application is use of these vessels in slush-freezing juice concentrates. Using ammonia as a jacket coolant, scraper-agitator equipped units permit precise blending of the concentrate with "cut-back" fresh juice, facilitate batch acid standardization, and provide process surge capacity. At the same time, they feed a steady stream of can-ready product to fillers.

Continuous processing has, in fact, created many new settings for sanitary process tanks that never existed under old batch procedures. Increased process capacity, for example, has required new methods in bulk storing and handling ingredients. Hence the large sanitary tank, often with agitator and temperature control, is replacing the numerous small containers.

Further, increased production has led to reduced working hours in many plants. Here, controlled tank capacity is necessary to hold over finished product or materials in process.

Initially developed to meet the rigid requirements of dairy inspectors, the sanitary process tank often has contributed to higher standards in other phases of food manufacture.

Newest Units for Meat Packers Unveiled at AMI Show

Spotted were 11 new packaging machines, 2 linkers, wiener stripper, 2 refrigerator units, 3 stuffers, 5 sanitary handlers, 1 meat grinder, 2 cutters, 3 process developments, belly injector. Other equipment, too

Latest Bacon-Wrapping Machines

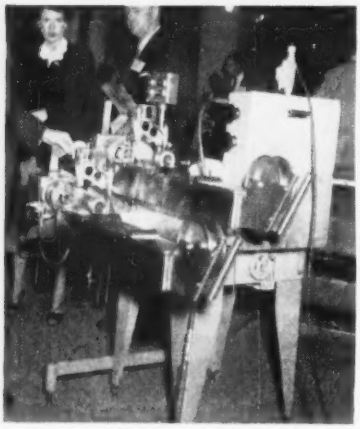
TENSION wrapping, double sealing unit insures durable, moisture-proof, tightly sealed package. Rate: 30-50 per min.—Battle Creek (Mich.) Bread Wrapping Mach. Co. (92A)

SIMPLE, sturdy construction, with few moving parts, is feature of bacon wrapper shown by Hayssen Mfg. Co., Sheboygan, Wis. Speed: about 45/min. ½- or 1-lb. packages. (92B)

DRUM-TIGHT wrapping is achieved with this unit. Film drawn over bacon during sealing to exclude air. Rate: 20-40/min.—Package Machinery Co., Springfield, Mass. (92C)

Specially Designed Wiener Linker and Strippers

LINKER takes 55-ft. strands of stuffed franks, twists into wiener length, coils in drum, and passes loops onto receiving stick. Rate: 1,400 lb./hr.—Kartridg-Pak Mach. Co., Chicago. (92D)



SAME firm displayed this two-headed stripper that removes artificial casing from wieners. Rate: 500-700 lb./hr. with only one attendant running machine. (92E)

FOR SMALL PACKERS, same firm exhibited this compact unit with one stripping head. Production is 300-350 lb. of frankfurters per hr. with one operator. (92F)

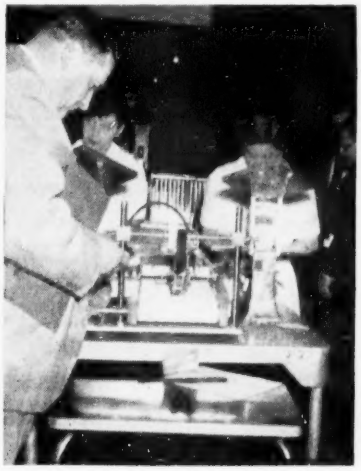
Other New Packaging Machines, Also Refrigerator Units

SHEETER, with pushbutton control, measures, cuts, dispenses film in choice of 23 lengths. Handles rolls up to 24 in. wide.—LectrOmatic Devices, Inc., Chicago. (93A)

AUTOMATIC tyer pleats casing, applies cap, and punches hole in cap. Rate: 1,000 per hr. Abolishes stockinettes; increases stuffing capacity.—Tipper Tie, Inc., Union, N. J. (93B)

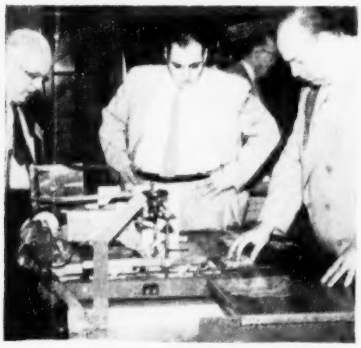
NEW MACHINE automatically secures second tie to artificial casings. Clamps (anodized aluminum and vinyl coated) are roll-fed.—Unite-It Fasteners, Summit, N. J. (93C)

SHADOGRAPH bacon scale (A) has twice movements of former. Is faster, more accurate. Scale (B) has color dial range for exact weighing.—Exact Weight Scale Co., Columbus, O. (93D)



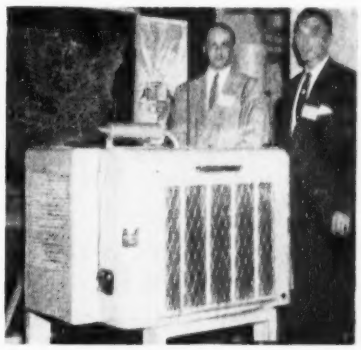
PACKAGING UNIT has dual weigh-station. Wrapped sliced luncheon meats fed to top sealer and rotary coding machine—Great Lakes Stamp & Mfg. Co., Chicago. (93E)

LOAF wrapper-sealer has Teflon-coated sealing plates for handling saran. Film fed from roll, cut by electrically heated wire.—Miller & Miller Inc., Atlanta. (93F)



LABELER is built to be attached to wrapping machine. Unit applies thermoplastic labels to prepackaged meats. Made by Miller & Miller Inc., Atlanta. (93G)

STREAMLINED truck-refrigerator plates have seamless coil, supported by sturdy evaporating fins, and leak-proof, seam-welded edges.—Kold-Hold Mfg. Co., Lansing, Mich. (93H)



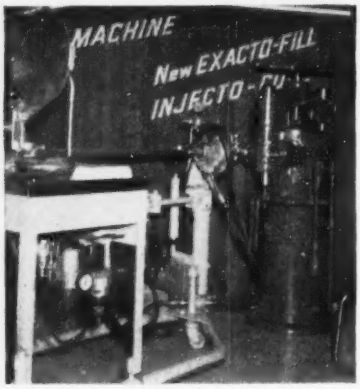
DUAL-POWERED truck refrigerator operates on gas engine on road; plugs into electric power at dock. Features thermostatic control.—U. S. Thermo Control Co., Minneapolis. (93I)

Want more information about any items in this picture article? Just circle key number (in parentheses at end of each caption) on the Reader Service coupon on page 159.

Turn Page for More New Units→

Special Stuffing Equipment

VACUUMIZER attached to stuffer loads two 4x4x24-in. molds with luncheon or hamburger meats to form uniform loaves without air pockets.—Miller & Miller Inc., Atlanta. (94A)



FILLER, hooked up to stuffer, meters exact weights of semi-viscous meat in 6—20-oz. portions into artificial casing. Clipper seals links with clips.—Globe Co., Chicago. (94B)

VACUUM PRESS, displayed by Allbright-Nell Co., Chicago, molds boned hams swiftly into square, spring-loaded mold for convenient slicing. Vacuum collapses aitch cavity. (94C)

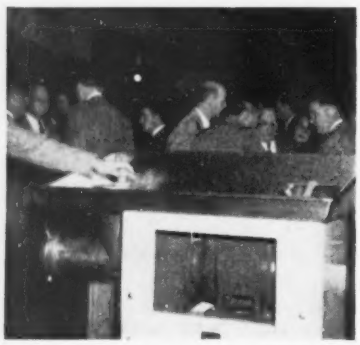
Newest Sanitary Handlers

RUGGED, easy-to-clean, lightweight, portable racks handle 250-lb. loads. Also new stainless drums (30- and 50-lb. sizes). Displayed by E. G. James Co., Chicago. (94D)

ALUMINUM ingredient drums have specially designed covers and sanitary features. Bottoms have 1-piece wearing rings.—Aluminum Cooking Utensil Co., New Kensington, Pa. (94E)

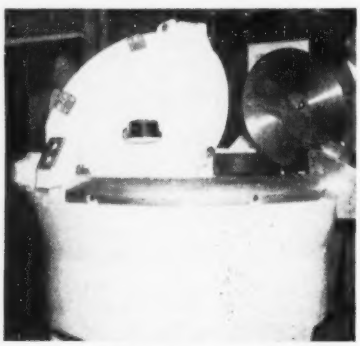
PORTABLE dump truck features box-shaped edges. Design eliminates crevices, avoids damage due to rough handling.—The Allbright-Nell Co., Chicago. (94F)

Streamlined Grinder and Cutters



GRINDER has stainless steel tray-type hopper to facilitate feeding and "up" production to 4,500 lb./hr. Maker: U. S. Slicing Machine Co., Inc., Laporte, Ind. (94G)

HYDRAULIC cutter slices frozen meats at high speeds. Safety devices plus complete encasement remove hazards to workers. Manufacturer: H. G. Weber & Co., Kiel, Wis. (94H)



SILENT CUTTER is designed to reduce cutting time 30-50% and improve meat texture. Incorporated are new safety and mechanical features.—J. E. Smith's Sons, Co., Buffalo. (94I)

Recent AMI Developments

ALUMINUM insulating jacket cuts radiant heat losses to about ⅛ those from non-insulated units. Saves nearly 50% steam for retorting, keeps room cooler. (95A)

THERMAL tape and temperature indicating-recording unit, demonstrated by AMI researcher, enables operator to control rendering process more accurately. (95B)

Other New Units, Process, Ingredient, Knife

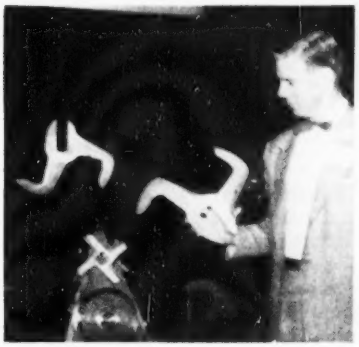
BEEF dropper (A) has easy-to-replace automobile hydraulic brake. Beef hoist (B) uses standard motor and component parts for easy maintenance. —Allbright-Nell Co., Chicago. (95C)

LATEST belly injector handles 4 slabs of bacon per min. Bellies carried through unit by 9 reciprocating needles actuated by bar.—Cincinnati Butchers' Supply Co. (95D)

NEW sheep-gut cleaner eliminates 6-7 workers. Handles seven guts at a time. Features cam-actuated roll that simulates hand-pulling. — Koch Supplies, Kansas City, Mo. (95E)

FATS from raw- and cook-rendered scrap were displayed by French Oil Mill Machy. Co., Piqua, O. New solvent process (in pilot stage) aims to eliminate fines. (95F)

AIM of new sausage ingredient (BAI approval applied for): To up moisture absorption and yield, speed cure, cut smoking time.—First Spice Mix. Co., New York. (95G)



2-IN-1 KNIFE is especially designed for silent cutters. Crank-shaped, it has double cutting action of present ones. —K. C. Seelbach Co., New York. (95H)

ALSO shown was a new 2-head vacuumizer-sealer. Equipped with upright, V-type feed belt, unit handles 25 packages of cold cuts a min. Maker: Standard Packaging Corp., Jersey City. (95I)

THE TECHNICAL MAN

His Woes . . . His Weaknesses . . . His Way to the Top

ROY E. MORSE
Director of Research, Wm. J. Stange Co., Chicago

Technical change is taking on the proportion of an upheaval in the food industry. Largely responsible for this revolution is the application of modern industrial and technical methods and principles to an age-old field.

In the center of this maelstrom is the technical man who is bringing about most of the changes. And he finds himself buffeted by a storm of his own making. As a result he is beginning to ask some pretty soul-searching questions, the answers to which are of serious concern to top management in the food industry.

Let us consider both sides:

TECHNICAL MAN TALKING . . .

Anyone who has attempted to keep track of even a small segment of the technical men in the food industry has noticed a constant movement. Technical men are trying to better themselves, and the movement for the most part is upward, salary and responsibility-wise.

However, salaries and opportunities often are not as enticing in the food field as in some other industries. So, many technical men move out of our field to greener pastures. The percentage leaving the field each year is appreciably higher for food than for other leading industries. Why this exodus? Salary isn't the only answer.

Low Man on Totem Pole

Too often, research and the technical man don't occupy a very important spot in the food processing industry. Compared with other industries, research expenditures by our industry are niggardly.

Measured as percentage of sales volume, the highest figure your writer has found admitted is 0.5%, with figures like 0.02% being more common. Recently, several large producers were encountered with 0.006% and 0.001%. By contrast, the average expenditure for research in the chemical industry is 2.60% ($300,000,000 per year); in pharmaceuticals, 12.2%. Even the figure for all manufacturing industry is 1.87%.

In addition to suffering from the generally skimpy research expenditures, the technical man frequently finds himself a prophet without honor in his own country. Those who have become captain of the ship are extremely rare. Yet, they definitely are needed in the higher echelons, just as are the sales and the merchandising experts.

With the food industry in a state of ferment, new machines, devices, and methods are appearing every day. And it takes a pretty shrewd technical student to put a company's money on the soundest developments.

If you don't take advantage of such advances, your competitor will, and you've started on the downgrade. There have been several excellent illustrations recently of the rapidity with which a front runner in this industry can fall behind.

Large companies without technical advice at top management levels have been called upon to make decisions they were not capable of making. These firms regret not having trained their technical chief to see the whole company picture rather than a small, sweaty segment.

Management's Missing Cog

Recognizing the importance of a technical voice in the management, some now send their technical men to advanced business school. After proper training, these men can lend to the management approach an objectivity which is badly needed.

Even sales campaigns and personnel programs can make good use of the scientific method. The recent appearance of Operations Research is a beautiful illustration of the application of mathematical method to production and distribution efficiency and economy.

MANAGEMENT SPEAKING . . .

Management is not entirely responsible for the unhappy and unrewarding role in which technical personnel often find themselves. Much of the blame must be borne by the technical man himself.

There is a great tendency for the scientist to emerge from school feeling that he is of a group apart. All too often the conviction prevails that he is beholden to no one and should be left undisturbed to chase unprofitable butterflies.

But it is a hard business fact that he is employed to help better the profit picture of his company. If he does not contribute to this end, he, himself, cannot expect to benefit.

Far too many will-o'-the-wisps are pursued by scientists. And a common defect is the tendency to ride a dying horse to the last gasp. If the road doesn't fairly quickly lead to a bright pasture, take another route. There are plenty of roads. You shouldn't stick to one path out of sheer bullheadedness.

Must Sell It to Management

But there is another time for tenacity which few technical men recognize. When research and development work has led to a successful conclusion, the technical man must sell the results to management—with emphasis upon savings and potential profit. Far too many technical men become inarticulate here. Many a piece of wonderful work has gone into the "round file" because of selling failure.

The very best of technical achievements can die a death of inept presentation.

Now after a research job is well done and well sold,

(*Turn to page* 199)

Handily suspended shaker . . .

. . . "bulldogs" bulk cars

Shakes Balkiness Out of Bulks

A number of materials cling inside bulk cars—won't fully flow out. Here, factors of this nuisance are pinned down. And an ingenious mechanical "getter-outer" is hailed for the swift way it cancels that cling, with sugar beet tests showing how

T. S. ABBOTT
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Bulk rail delivery of ingredients and other materials is bringing new efficiency to many food operations. But attending this time and labor-saving technique is a frequent problem—how to discharge a "balky" load.

Far too often, inexperience and inability to solve a car unloading problem has chucked-out a much needed bulk handling project. For densely packed, frozen, agglomerated carloads sometimes involve more time and trouble than the unit-container method being supplanted.

Some basic engineering—using widely tabulated data on material specific weights and angle of slide—goes a long way toward understanding and remedying such bulk-discharge problems. Unfortunately, however, most hopper cars are equipped with bottom slopes of about 30 deg. So this limits materials that can be gravity-discharged from these conveyances. Also, variable temperature and moisture are complications.

As a basic tool toward speedy solution of unloading "jams," some companies are now employing car shakers at rail sidings. And this mechanical aid has brought more than a cure for the toughest of such problems. Coupled with good operating know-how, it has also:—

- **Placed the whole car-unloading operation under one, remotely stationed man.**
- **Upped discharging rate to as much as 15 full cars per hour.**
- **Meshed incoming material flow with conveyor and production speeds.**

Let us now consider the hard core of the problem—the fixed design of bulk transport hopper-bottom cars.

As stated, practically all bulk cars used to move materials needed in food processing are built with the steel plate floor (slope sheet) slanted at an angle of 30 deg. to the horizontal. This means that bulk materials, under ideal conditions and with an angle of slide of 30 deg. or less, will drop out of the car completely under the influence of gravity.

But what about such materials as bagasse, sugar beets, bran, etc., that require a greater angle in order to slide.

Gravity will cause material to flow out of a car only until the angle between the horizontal and its top surface is equal to the angle of slide of the specific material. What remains in the space between the top surface of the material and the 30-deg. steel floor plate will not flow by gravity and will require applied force to cause movement.

A first step for the engineer, then, is to consider the individual angles of slide of materials that are being bulk delivered. This has been tabulated by equipment firms, with data listed under "ideal" conditions—when material is sized, and has little moisture and no packing. It must be kept in mind that deviations from such "ideal" conditions would change such data.

When conditions vary from the ideal, the angle of slide increases. This in turn increases the volumetric percentage of full load that will remain in the car after gravity has done its work. This is very significant, since many food plant materials rise above the 30-deg. figure when ideal conditions are modified.

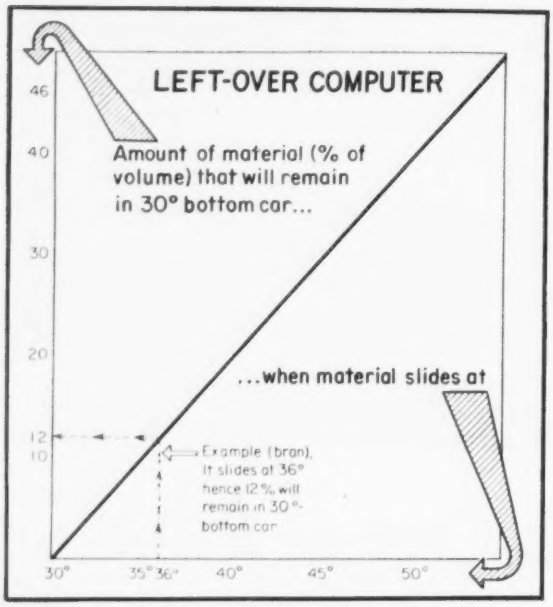
Unloading Calculations

Packing in transit, moisture, and partial freezing are a few of the factors increasing angle of slide. For example, absolutely dry bituminous coal will slide at an angle of 29 deg.—but when damp the angle of slide increases to 40 deg.

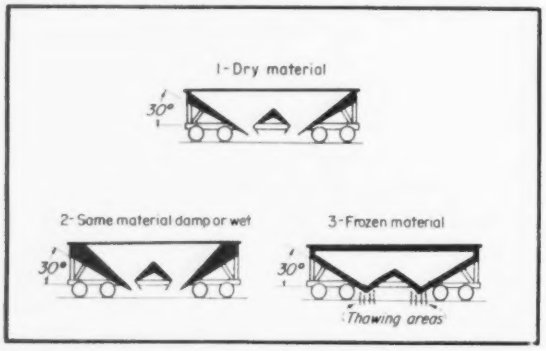
In winter there is also the danger of freeze preventing any material from sliding, necessitating a thawing treatment before hopper discharge can be accomplished.

Turn page for Flow Factors

Fast Facts on Flow Factors



"CLING" VOLUME of a bulk load may be quickly determined on this graph by scribing vertical line up from material's angle-of-slide figure to diagonal, then carrying line to left border, which gives amount remaining in 30-deg.-bottom-plate hopper car after normal gravity discharge. Graph is based on typical, fully loaded 50-ton car of 2,100 cu. ft. capacity. Note that as angle of slide of a material increases 1 deg., load remaining in car rises 2 percent.



HOW DIFFERENT conditions affect hopper-car discharge.

TABLE I—SOME MATERIALS handled in bulk, the angles at which they slide, and their specific weights. Data are based on "ideal" conditions. Materials are sized, contain a minimum of moisture, and are not compacted. (From Stephens-Adamson Mfg. Co., Aurora, Ill., Gen. Cat. 55)

Description	Angle of Slide (Deg.)	Specific Weight (Lb./Cu. Ft.)
Ash, black, ground	27	105
Ashes of bituminous coal	40	35–45
Ashes, damp	50	40–50
Babassu nuts, ground	40	45
Bagasse, wet sawdust	45	4
Beets, shredded sugar	31	7.6
Bones, animal pulverized	50	50
Bone char, ground	35	40
Bran	36	16–26
Carbon, ground	21	50
Chalk, precipitated, powdered	45	18
Charcoal, bone, (carbonated granular)	27	60
Charcoal, wood pulp, granular	35	26.4
Chips, wood	22	15–30
Cinders, (coal, ashes & clinkers)	35	40–45
Coal, anthracite, broken of any size, loose	22	52–57
Coal, anthracite, chestnut	22	46
Coal, bituminous, minus ¼ inch slack dry	29	40–50
Coke, pulverized	34	25
Coke, petroleum, crushed	27	33–36
Copra, medium sized pieces	20	33
Copra, expeller cake, chopped	20	29
Corn, field (on cob)	20	45
Dust, flue, blast furnace	45	40
Dust, limestone	38	55–65
Earth, fuller's, raw	35	42
Gravel	30	120
Lime, burned, pebble (sized)	30	53
Lime, fine (spent, dry carbide)	40	45
Limestone, pulverized	42	85
Malt, spent, dry	28	10
Salt, granulated	31	81
Salt, rock, crushed	25	75
Sand, mine run	35	90–120
Sand, coarse sized	30	90–100
Sand, very fine	32	90–110
Sawdust, dry	36	10–30
Sawdust, ground	45	20
Sugar, tailings	38	57
Walnut shells, ground, 320 mesh	55	21

TABLE II—EFFECTS of different material slide angles and/or specific weights show up in this tabulation. Using same specific weight with varying slide angles and employing data plotted with our graph, specific weights of "cling" materials have been computed (last column).

Slide Angle Of Material (Deg.)	Percent Volume Remaining in 30-Deg.-Bottom Car (From Graph)	Specific Weight (Lb./Cu. Ft.)	Weight Remaining In Car (Lb.)
33	6	5	630
		20	2,520
		30	3,780
		50	6,300
		60	7,560
40	20	5	2,100
		20	8,400
		30	12,600
		50	21,000
		60	25,200
50	40	5	4,200
		20	16,800
		30	25,200
		50	42,000
		60	50,400

How much work is involved in unloading gravity resistant material from a hopper car?

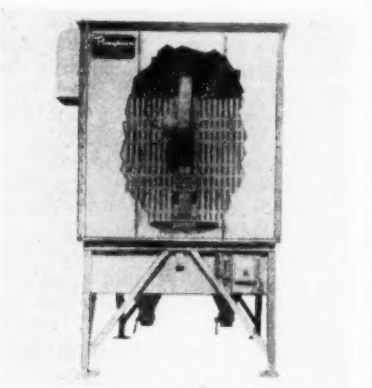
Suppose we take a standard hopper car with a volumetric capacity of about 2,100 cu. ft. and determine specific weight of product in question. Using bran, for example, we find the weight is 25 lb. per cu. ft. Multiplying 2,100 cu. ft. by 25 gives total weight of a full bran load—52,500 lb.

Now consider the angle of slide of bran, which is 36 deg. (as noted in our Table I). Now by plotting on our accompanying graph (see broken-line example) the angle of slide against percent volume of material remaining in car, we find that 12 percent of the load will cling after gravity discharging.

Multiplying 52,500 lb. (the full load) by the 12 percent remaining indicates that 6,300 lb. of bran remains in the car. Thus, under ideal slide conditions, over 3 tons of bran still have to be removed by hand or mechanical means after gravity has done its work.

But when considering this type of problem, another factor must be aired before conclusions can be drawn. That is, the weight limit of the hopper car. For instance, a car may have a volumetric capacity of 2,100 cu. ft., with a nominal load limit of 100,000 lb. and a maximum load limit of 129,100 lb. This means that on the basis of the nominal load limit any material weighing over 47.6 lb. per cu. ft. should not be loaded to full car level. Also, to stay below maximum load limit, this figure should be 61.5 lb. per cu. ft. or less. (*Turn to page 150*)

NEW EQUIPMENT & SUPPLIES



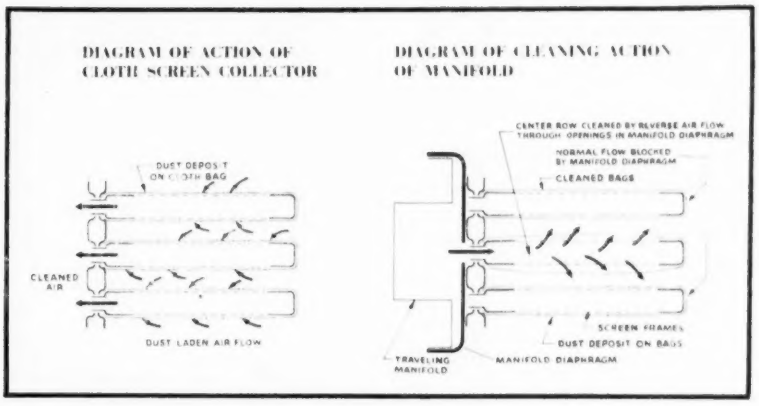


DIAGRAM OF ACTION OF CLOTH SCREEN COLLECTOR
DUST DEPOSIT ON CLOTH BAG
CLEANED AIR
DUST LADEN AIR FLOW
DIAGRAM OF CLEANING ACTION OF MANIFOLD
CENTER ROW CLEANED BY REVERSE AIR FLOW THROUGH OPENINGS IN MANIFOLD DIAPHRAGM
NORMAL FLOW BLOCKED BY MANIFOLD DIAPHRAGM
CLEANED BAGS
SCREEN FRAMES
DUST DEPOSIT ON BAGS
TRAVELING MANIFOLD
MANIFOLD DIAPHRAGM

Simplified Maintenance Marks Dust Collector

Reduced operating and maintenance costs are claimed with this new type CH-3, self-cleaning cloth-screen dust collector. Continuous automatic dust collection, constant air volume and suction, and positive reverse flow filter cleaning does the trick.

Collector uses the principle of reverse air flow for continuous cleaning of its cloth filters. This is accomplished by action of a traveling manifold whose integral reverse air blowers takes its air directly from clean air side of collector.

In operation, manifold covers three vertical rows of cloth-covered screen frames at one time. Reverse flow of air is blown through center row of screens while normal air flow through other rows is blocked off. Blocking action is accomplished by flexible diaphragm on manifold which is inflated against grid wall under flow of pressure when blower unit is centered on a particular row.

This mechanical arrangement causes dust to be blown from all external surfaces of filter elements and allows it to drop into hopper instead of being re-entrained. It also prevents air short-circuiting. Blower motor in traveling manifold is interlocked with main exhauster motor.

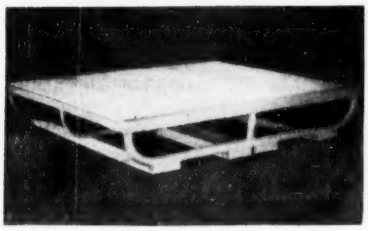
Manifold travels at slow speeds in both forward and reverse directions accomplished by a reducer and a fractional hp. motor controlled by a limit switch and magnetic reversing starter. Elimination of need for shut downs for mechanically cleaning permits collector to operate continuously. Further, accumulation on cloth surfaces is now maintained at a uniform value, thus air flow resistance of collector remains relatively constant.

Standard sizes of collector are furnished with six-screen-high construction. Also available for small air volume problems are four and five-screen-high by 5 ft. long screen sections. Existing installations of type CH cloth screen collectors can be converted to self-cleaning arrangement by removal of mechanical rapping mechanism, replacement of grid wall, and slight alterations to screen frames and clamping devices.

Other features of collector are: All steel wire mesh screen frames (prevent cloth collapse under air load); screens of convenient size and weight for easy handling by one man; cloth filter bag of simple design that can be applied without tension or strain; inherent electrical grounding on screen frames; all moving parts of cleaning mechanism located on clean air side, thus eliminating wear; and accessibility on both dust and clean sides for inspection. — *Pangborn Corp., Hagerstown, Md.*

Circle 99A on Reader Service Card

Steel-Wood Pallet Set Without Fasteners



This new type of steel and hardwood pallet is assembled entirely without fasteners. Design feature eliminates all cost of maintenance and replacement due to fastener failure.

Steel members of unit consist of three tubular steel skid runners welded to a deck-retaining frame of angle-iron which armors the hardwood deck. Hardwood boards are secured to all-welded structure by novel devices.

Deckboards are nested in retaining frame and are clamped in position by a keyboard spring lock. Boards can be removed and replaced—either by hand or with small hand tools—in a matter of seconds.

Bottom boards are individually secured by heavy-gage steel containers welded to skid runners, called "Nest Grips," which entirely encase and protect board ends.—*Econoweld Corp., 515 Callahan Bldg., Dayton 2, O.*

Circle 99B on Reader Service Card

Rate-of-Rise Thermostat Eliminates Overshoots

Hazardous temperature overshoots are prevented in fast warm-up systems with use of this rate-of-rise thermostat.

Unit controls rate of heating during warm-up period and aids substantially in bringing system safely up to desired temperature. Controls of this type are also useful in monitoring processes in which rate of heating must be controlled or in which temperature overshoots from a rapid heating cycle must be prevented.

Thermostat may be used either with standard temperature controls or as a separate safety control. When

used in series with a temperature controller, unit brings system up to desired level from a "cold" start without overshoot and oscillation around control temperature. Thus, temperature is stabilized without a preliminary period of "hunting". After warm-up period, standard temperature controller takes over and rate-of-rise unit becomes a safety check.

Unit may also be used separately as a safety limit switch to shut down a process or machine where excessive rates of temperature rise indicate an abnormal, hazardous condition.

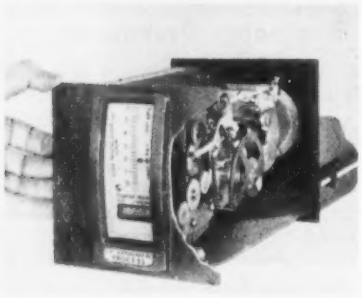
Thermoswitch is adjustable to control any heating rate between 10 and 100 deg. F. per min. When heating rate exceeds pre-set limit, switch contacts inside unit open and interrupt heating cycle temporarily. After heating rate falls off to a safe level, contacts once again close and cycle resumes, unless a circuit breaker arrangement is used.

Unit can be used in any ambient temperature between minus 100 and plus 550 F. Unit is hermetically sealed to protect the contact assembly from dust, grease, water or oil vapors.

Both outer shell, which houses contact assembly, and exterior electrical terminals are made of stainless steel. A triangular mounting flange makes installation easy. Cartridge extends 3¾ in. below mounting flange, and overall length is approximately 4¾ in. Unit weighs less than ¼ lb. Dia. is ⅝ in. Electrical rating is 5 amp. at 115v. a. c., or 2 amp. at 28v. d. c.—*Fenwall Incorporated, Ashland, Mass.*

Circle 99C on Reader Service Card

Integrating Instrument For Graphic Panel Use



This miniature unit, incorporating a full size integrating mechanism and standard 5-digit counter, is one of a series of small instruments designed primarily for mounting in graphic panels. Unit, measuring 6 by 6 by 14⅜ in., indicates instantaneous rate and continuously integrates the measured variable.

High speed integrating unit senses and totals flow rate of measured liquid or gas every 2.5 sec. (24 times per min.).

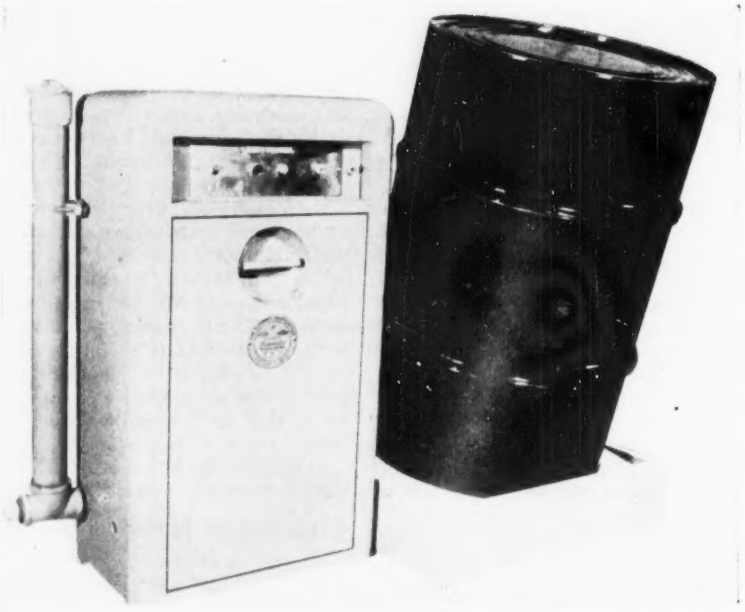
This very rapid counting rate allows varying flows to be totalled to accuracies within 1 percent of full scale. Furthermore it makes the totalizer responsive enough to take full advantage of sensitivity of flow rate meters. Even slight variations of flow caught by the primary are picked up by the totalizer. Totalizing mechanism is oil-immersed for permanent cleanliness, lubrication, and freedom from wear and corrosion.

Instantaneous flow rate is indicated on a vertical strip by a pointer attached to integrator calibration cam. Pointer is positioned along with cam by a pneumatic receiver which operates at signal pressures of from 3 to 15 psig.

A feature is heavy duty 100 rpm. synchronous motor which establishes a timing base for integrator. The integrator-indicator may be combined with an impulse-type counter to operate shut-off or other end point control devices after a certain flow has been measured.—*Fischer & Porter Co., 15 Jacksonville Road, Hatboro, Pa.*

Circle 100A on Reader Service Card

Unit Automatically Feeds Washing Compound



Processors employing mechanical washers—bakers, bottlers, brewers, dairymen—are prospects for this new electronic control unit for detergent solutions.

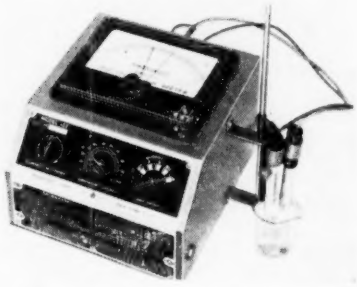
Easily and quickly attached to the washer, the Divomatic solution control employs an electronic device which automatically feeds washing compound and maintains proper solution concentration for efficient washing operation. Unit can feed and maintain concentrations ranging from 0.1 to 7 percent automatically.

A new conductivity cell termed radical in design enables the unit to maintain a high degree of accuracy in automatically measuring solution strength. A simple "on" switch and solution concentration setting are only manual operations.

Unit is available in four models: B1 for large bottle washing machines; BC for small bottle washers; C for can washers and DX for bake pan washing machine. B1 (illustrated) incorporates a special tilted platform which accommodates a full drum of compound and feeds it automatically from drum, eliminating handling of caustic washing compound.—*The Diversey Corp., 1820 Roscoe St., Chicago 13.*

Circle 100B on Reader Service Card

Portable pH Meter Is Highly Accurate



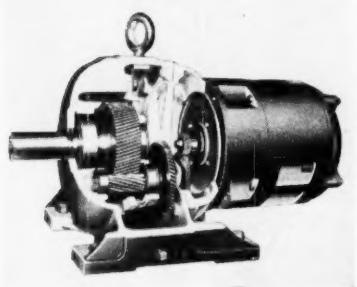
Three ordinary radio batteries will service this simple-to-operate, Model 125 portable pH meter. Reading accuracy claimed is 0.03.

Unit employs miniature tubes and electronic circuits. All electronic components are contained in a single plug-in unit which can be easily exchanged. Readings are taken on a single 0 to 14 scale without switching of ranges. Carrying frame with beakers and plastic bottles is available.

Stabilized power supply unit can be furnished to operate meter from a.c. power line without use of batteries.—*Photovolt Corp., 95 Madison Ave., New York 16.*

Circle 101A on Reader Service Card

New Gearmotors Have Wide Speed Range

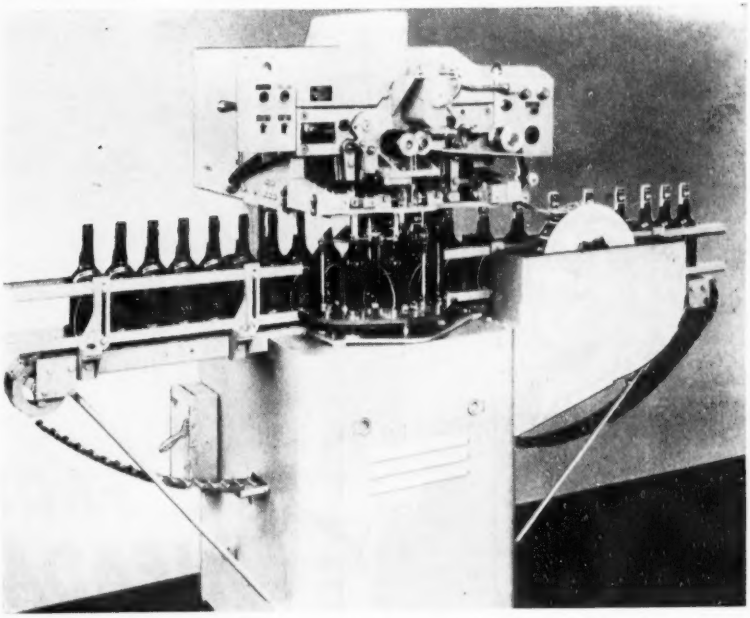


A complete, new integral gearmotor series from 1 to 15 h. p. has been announced. Motors are offered in a wide range of speeds, in single, double and triple gear reductions.

In new series, gears meeting A.G.M.A. Class I, II and III specifications can be had to fit varying load requirements. Motors are available with constant or variable speeds and with protective frames to operate under most atmospheric conditions.—*Century Electric Co., 1806 Pine St., St. Louis 3, Mo.*

Circle 101B on Reader Service Card

Electric Eye Permits Use of Printed Bands



Addition of an electric eye attachment to this automatic banding machine now makes possible the use of printed instead of plain cellulose bands.

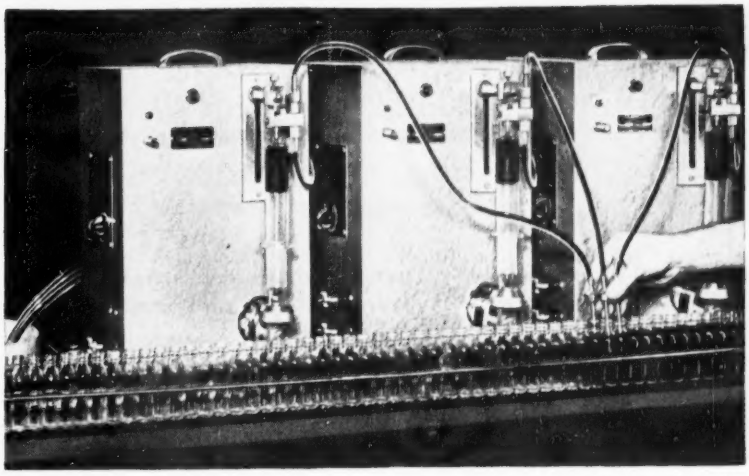
Machine is also available with bottle spotting mechanism when a printed band is to be accurately located on bottle with respect to labels.

With these additions, machine becomes universal in application. It can be changed from printed to plain bands by simply pressing a button.

Any container that is normally fed through automatic cappers, fillers or labelers may be automatically banded at packaging line speeds with new machine.—*Economic Machinery Co., Div. of Geo. J. Meyer Mfg. Co., Worcester, Mass.*

Circle 101C on Reader Service Card

Multiple Unit Provides Faster Vial Filling



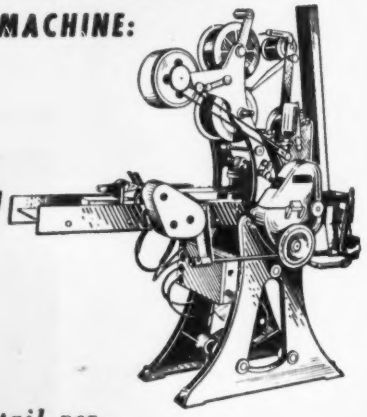
Stepped up packaging speeds are reported with use of this new Add-A-Unit, multiple type, electronic vial filler.

Practically any number of units may be operated together in tandem for high speed filling of vials and small containers up to 4½ oz. in size.

FROM HEADACHES

SINCE THE BAYER COMPANY DIVISION TURNED TO SCANDIA AUTOMATIC BUNDLING MACHINES

YOUR PRODUCT, TOO, DESERVES THE BENEFITS OF THE *SCANDIA* AUTOMATIC BUNDLING MACHINE:



- **VERSATILITY**
  bundles in Kraft, glassines or cellophane
- **REDUCED COSTS**
  greater production and shipping costs reduced
- **IMPROVED APPEARANCE**
  custom wrapped; permits mass displays
- **COMPACTNESS**
  machine occupies less factory space

Your inquiries concerning detail performance characteristics are invited.

SCANDIA

Manufacturers of Better Packaging Machinery

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MANUFACTURED UNDER BRONANDER PATENTS

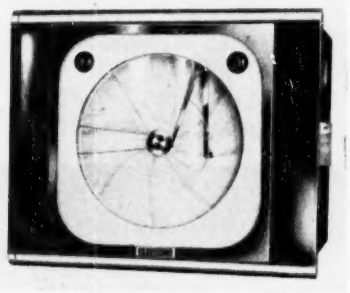
Oils, suspensions, concentrated, and aqueous solutions are handled with equal facility. All units operate in synchronization, and removal of any unit for servicing does not effect operation of others. Desired production rate can be attained by simply adding units as required. For example, three unit set-up shown fills 50,000, 1 oz. vials per 8 hr. day. Only one operator is required.

Volume delivered by each unit can be accurately adjusted independently of other units. Entire filling mechanism of each unit can be removed for steam sterilizing. Pistons can be furnished in stainless steel or glass as desired. Machine is a positive displacement type filler, hence, variations in bottle size cannot effect accuracy of fill. Synchronizing mechanism and motor control are electronic.

Assembly takes only minutes to set up. Unit is also applicable for metering operations where varying quantities of liquids must be dispensed in batch or continuous processes. Ratios as high as 2000:1 are attainable. —*National Instrument Co.*, 5005 *Queensbury Ave., Baltimore 15, Md.*

Circle 101D on Reader Service Card

Regulates Temperatures To Pre-Set Patterns

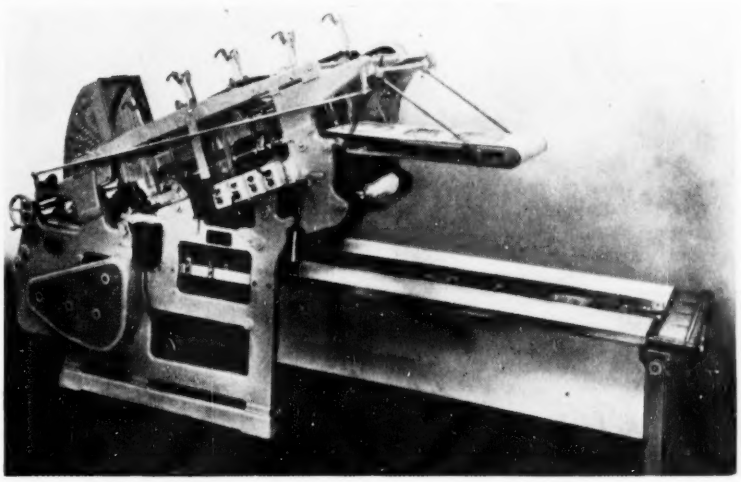


Any desired program, such as a heating, soaking, and cooling cycle can be accurately maintained with use of this new time-temperature program controller. New unit regulates temperatures according to a predetermined schedule of changing values.

Desired schedule of temperatures is prescribed by contour of a transparent plastic cam. Same controller can be used to maintain any number of different temperature programs, since cams of different contour are easily cut and interchanged. Instruments employ an electronic control system with proportional input action optionally available.—*The Bristol Co., Waterbury 20, Conn.*

Circle 103A on Reader Service Card

Produces Tight Fitting Bacon Packages



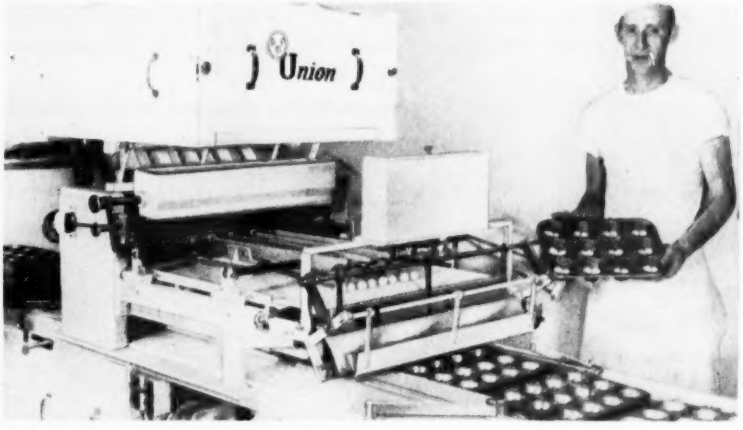
This new Model FB wrapping machine is reported to produce an exceptionally tight wrap with minimum air space between bacon and wrapper.

Using a new mechanical process, machine draws wrapping material tightly over bacon while being sealed. New sealing unit eliminates bottom wrinkling and entire underfold is firmly sealed to bottom of package. Machine requires only one operator to feed and remove wrapped bacon.

Speed is 20 to 40 packages a minute. Unit is easily adjustable for various sizes, making it possible to wrap both 1 lb. and ½ lb. packages.—*Package Machinery Co., East Longmeadow P. O., Springfield, Mass.*

Circle 103B on Reader Service Card

Turns Out Twin Rolls At 280 Per Minute

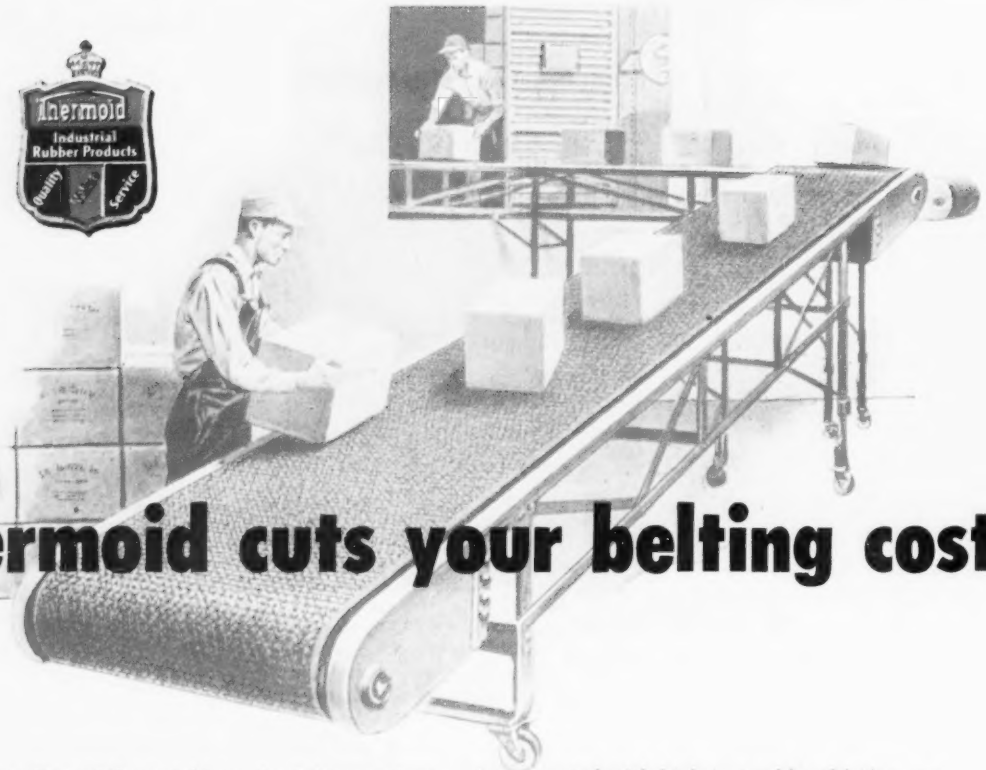


Two rounded dough balls are produced, oiled, and panned automatically two-to-a-mold in muffin or cupcake pans with use of a new twin-roll attachment on the Pan-O-Mat.

Equipment operates at standard speed of 280 rolls per min., or 1,400 dozen buns per hr. Many bakers are replacing clover leaf rolls, made by hand panning, with the new twin rolls made automatically.

Number of items and varieties produced with this equipment is being increased as fast as new applications are discovered. Hamburger and frankfurter buns, single or cluster, package rolls fully baked or brown 'n serve, and other items are all being produced at standard speed of 280 per minute, converting production to straight line operation.—*Union Machinery Co., Joliet, Ill.*

Circle 103C on Reader Service Card



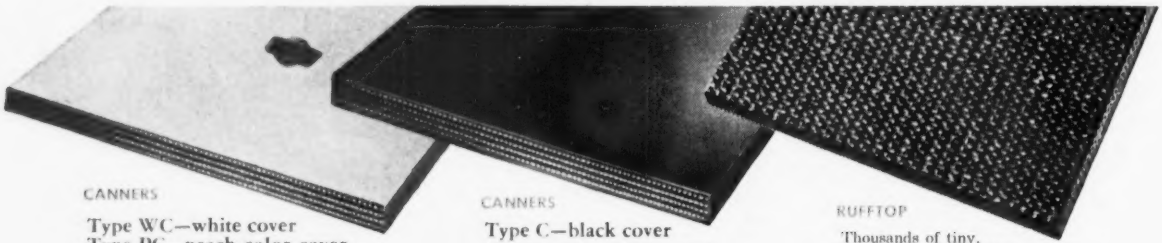
Thermoid cuts your belting costs

Regardless of the weight, content, temperature or other characteristics of the materials you handle, there's a Thermoid Conveyor Belt that will stay on the job longer, reducing your handling costs.

Thermoid "built-for-the-job" Conveyor Belts, like those shown below are providing maximum service for leading processors and packers, coast to coast. Strong cotton fabrics, thoroughly impregnated with high-test rubber friction, are combined with tough, wear-resistant rubber covers. Welded together under extremely high pressures to assure exceptionally strong, durable belting.

Your Thermoid Distributor can help you select the belt best suited to your needs. If your problem is unusual, he'll call an experienced Thermoid Sales Engineer.

Thermoid Belting specifically designed for food processing applications:



CANNERS

Type WC—white cover
Type PC—peach color cover

For sorting and carrying fruits and vegetables. Acid-resistant. Imparts no odor or taste to food.

CANNERS

Type C—black cover

Ideal for use in portable conveyors where food is not in direct contact with belt. For handling packages, refuse, or waste.

RUFFTOP

Thousands of tiny, irregular-shaped gripper points enable this belt to carry packages up inclines of 30-35° with no backslip.

Write for Thermoid Conveyor Belting Catalog #3679, containing full engineering data.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

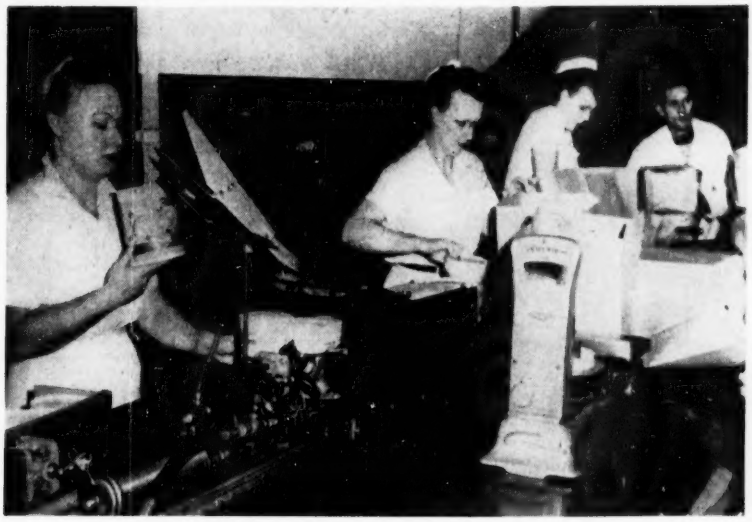
Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

For more information, use coupon on page 159.

Semi-Automatic Unit Speeds Ice Cream Packaging



Girl at filler puts covered top of empty container into machine. Cover travels down a short chute and meets up again with container which has meanwhile been filled. Then second operation of machine places cover on filled container.

Of interest to ice cream manufacturers is a new semi-automatic machine for covering 5 in. dia. ½ gal. containers. Unit is reported to considerably increase the speed and efficiency of the packaging operation.

Machine which operates on air pressure of 40-60 lb. weighs 80 lb. and is compact enough to fit conveniently on any packing table.

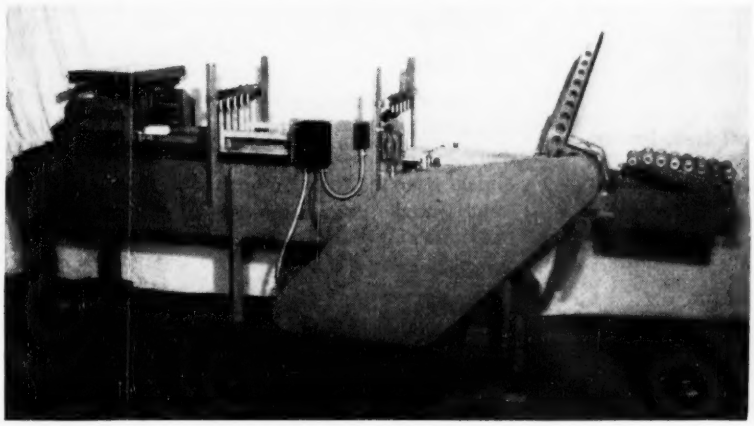
Rated speed is 600 gal. per hr. without operator fatigue factor. According to maker, experience of numerous users packaging at rate of 300 gph. save one employee and at 450-600 rate save two employees.

Only requirement is air pressure, between 40 and 60 lb., with stronger feed to be regulated. Consumption is ¾ cfm. with the freezer running at a capacity of 600 gph.

Machine is made of stainless steel and chrome for quick and easy cleaning. Automatic lubrication is provided. —*Sealright Co., Inc., Fulton, N. Y.*

Circle 105A on Reader Service Card

Bottle Caser Is Compact, Has Positive Feed



Improvements reported for this new Silva Streak, straightline, bottle caser are a positive feed, and a spreader loading table. Unit is compact to save floor space, and is easy to operate.

Mechanical discharge hold back has been eliminated by re-design of the discharge conveyor. Now bottles entering unit in single file are positively placed in proper row in reservoir section. When machine is filled, operator presses a pedal which pushes up hold-back pins, in front of bottles in this reservoir, and simultaneously separates bottles to be cased, eliminating possibility of label scuffing.

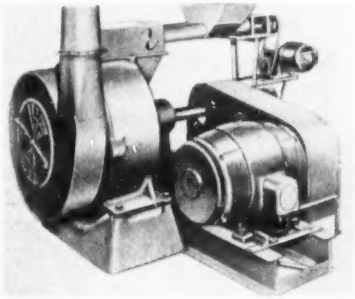
A case is then placed over loose bottles, and operator depresses a switch, starting rotor, which brings bottles up into case, and continuing its rotation, gently deposits cased bottles, inverted, on discharge conveyor.

Caser is furnished to handle one size bottle and one case arrangement. Change parts, which are easily and quickly installed, allow for rapid conversion to other sizes and arrangements.

Unit takes up little space, its dimensions being 10 ft., 10 in. in length, 2 ft., 11 in. in width, and adjustable in height from 31 to 34 in. Speed of operation is from 12 to 18 cases per min.—*King Sales & Engineering Co., 441 Folsom St., San Francisco 5.*

Circle 105B on Reader Service Card

Pulverizes Products To Sizes Desired



Versatility in producing a wide range of product sizes from coarse to fine is the outstanding feature claimed for the recently developed "Superfine" pulverizer.

Unit will process a variety of fibrous, brittle or oily materials, such as whey, whole wheat grain, spices, albumin, beet sugar, and cocoa. Crystalline, granular, or fibrous materials can be handled with only minor modifications of the beaters or liners employed with the unit.

Product sizes attainable range from coarse to ultra-fine. In general, coarse particles may include those from 20 to 80 mesh; fine, from 80 to 200. Superfine covers the 200 to 400 mesh group, and ultrafine, down to 3 to 5 microns. Effectiveness of pulverizer is based upon use of centrifugal forces

stainless steel bar users:

Get all three at CRUCIBLE

faster

delivery —

Our unique mill scheduling operation is geared to handle any size order for stainless steel bars — whether it be for pounds or carload lots. And we operate our own national chain of warehouses to enable us to make immediate shipments to you directly from a local source over which we maintain complete control.

maximum

machinability —

Recognizing the importance of good machinability, our mill metallurgists maintain close control over all manufacturing operations to insure that the machinability characteristics of each stainless bar produced is of the maximum obtainable.

complete

range —

All our warehouses now have complete stocks of stainless and heat-resistant bars . . . in all sizes, all grades and all finishes. No matter what your requirements are in the way of stainless and heat-resistant bars we can take care of them.

Next time you need stainless steel bars, be sure you call your nearest Crucible warehouse.

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53 years of Fine steelmaking

STAINLESS STEEL BARS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

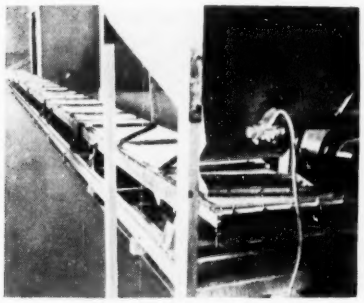
and air currents to grind by shear and impact, with simultaneous internal classification and recycle of oversize.

Another interesting feature of unit is temperature and humidity control, which makes it possible to provide almost any commercially attainable temperature and moisture content in summer and without refrigeration. For extreme requirements, jacket chilling or heating is available. With use of a multiple feeder four materials, in accurate pre-determined ratios, can be blended and ground.

Grinding chamber can be dis-assembled in 10 min. for quick clean-up or maintenance. Unit is made in a range of 5 sizes, capacities from 50 to 5,000 lb. per hr. of finished product, depending on size of mill, material ground and fineness desired. Maker offers a test grind of any product without charge or obligation.—*Schutz-O'Neill Co., 319 Portland Ave., Minneapolis 15, Minn*

Circle 105C on Reader Service Card

Moves Bulk Materials In Closed Housing



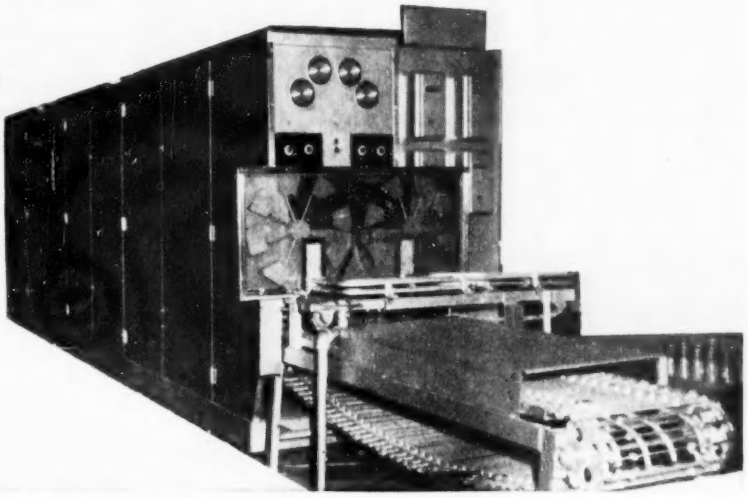
Certain bulk materials must be transported within a closed housing and can be efficiently moved on new units known as "Oscilveyors".

These units oscillate with a continuous series of forward-and-up, downward-and-back motions. This action cycle moves material by throwing it forward short distances.

Number of vibrations per min. and forward throw are critical factors in handling different materials. For example 575 vibrations per min. and a forward throw of $\frac{5}{8}$ in. might be an excellent combination for one material but not at all satisfactory for another. Incorrect vibration-throw combination could result in the flow of only top layer material. With use of samples, maker is able to determine proper relationship for given materials on test facilities.—*Gifford-Wood Co., Hudson, N. Y.*

Circle 107A on Reader Service Card

Sterilizes Bottled Chocolate Beverages



Increased popularity—and therefore output—of bottled chocolate beverages is seen with use of this new fully automatic sterilizer. First unit is now being installed in an eastern bottling plant.

The result of five years of development plus months of "on-the-line" testing, this machine is reported to make possible complete automatic bottling, in addition to insuring quality control of chocolate product.

Trade-named "Ster-O-Matic", unit has an overall appearance of a bottle washer. It is 27 ft. long, 72 in. wide and 8½ ft. high. Capacity is 120 cases, or 2,880 bottles, per hr. at any cooking temperature desired. Through simple conveyor and electrical hook-up, it becomes an integral part of existing bottling line. Here is how machine functions:

Filled and capped bottles, with contents pre-heated to 140 deg. F. by a heat exchanger, also supplied by maker, are transported directly from filling machine via conveyor to sterilizer.

The bottles are picked up by a revolving feeder which delivers them horizontally onto a continuous cable conveyor inside the machine.

Moving conveyor "pockets" in which bottles are placed pass slowly under a battery of heat supplying infra-red lamps. Pockets are specially designed to gently revolve bottles and agitate contents. This revolving-agitating action permits even heating of contents and prevents caking of chocolate. There are three basic steps in the unit's performance:

1. Inside first chamber, bottles are slowly brought up to a temperature of 240 deg. F., this "heating-up" process lasts 5 min.

2. For the next 20 min., bottles are passed through even heat cooking chambers, which are maintained at 240 deg. F. steadily and are thermostatically controlled.

3. For final cycle of 5 min., in which the bottles pass through the machine, they are gradually cooled. Maker is prepared to add, as optional equipment a complete after-cooling cycle to bring temperatures in bottles as desired.

In initial machine, bottles emerging from unit can pass onto an accumulating table. Only one man is required to supervise operation of unit at full capacity.

Another important advantage claimed for unit is that "it is always ready for duty". New machine has full opening panel doors running length of sides for easy cleaning and maintenance. A large transparent plastic front viewer and "peep sights" in back of machine enables a supervisor to inspect process without opening panel doors and without halting operation. Large instrument panel is in full view of the operator.

If a bottle breaks, broken glass automatically falls to full length metal trays directly below cable conveyor, thus permitting continuous operation. However, maker points out that only defective bottles could possibly crack during cooking process.

Sterilizers, completely wired and tested at factory, will be shipped as a package unit.—*Ster-O-Matic Co., 445 Avenue C, Bayonne, N. J.*

Circle 107B on Reader Service Card

only STONE with MULTI-TONE

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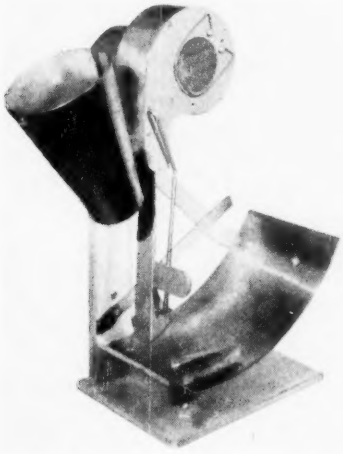
Semi-Automatic Unit For Bagging Giblets



Reduced costs in putting up chicken and turkey giblets are claimed with use of this semi-automatic bagging machine.

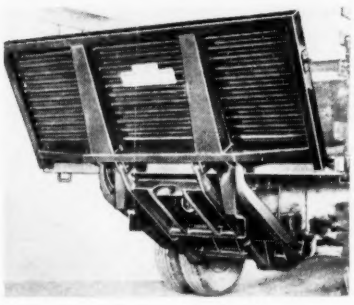
Faster operating speeds made possible by the machine do the trick.

In operation, a blower, equipped with a sanitary filter, holds the bag open while the operator puts a measured quantity of giblets into the funnel. Another bag slips into place immediately and the operation is repeated without lost time or motion.

Unit takes bags from 2¾ to 5 in. wide and up to 7½ in. high. A plastic cover to keep the machine clean when not in use is available. Company will also design special machines for bags outside the dimensions specified.—*Anderson Bros. Mfg. Co., 1907 Kishwaukee St., Rockford, Ill.*

Circle 109A on Reader Service Card

Elevating Gate on Truck Makes Job Safe, Easy



Heavy or bulky objects can be handled safely and without strain by one man with use of this new and improved hydraulic-powered elevating truck gate.

Unit can be mounted on any truck and can lift a maximum 2,000 lb. payload. Two platforms are available; a ramp type and platform, or square edge type. Gate floor is corrugated for greater load capacity and to prevent floor sag. All hydraulic mechanism is mounted to clear axle housing with no loss of ground clearance. Load bearing points utilize bronze bearings with high pressure lubrication fittings.

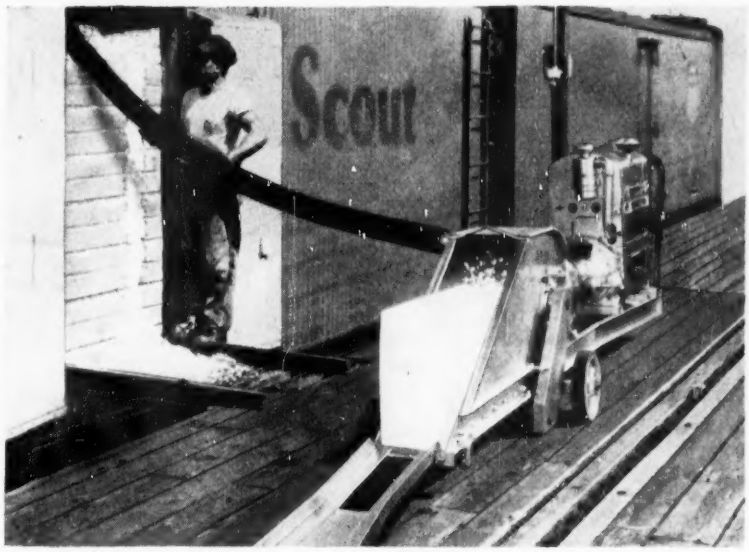
Double-acting cylinder for all hydraulic functions provides more than enough power for lifting, lowering, closing, and opening tailgate. A power take-off on truck mechanism provides hydraulic pump with power. New elevating truck tailgate can be opened and lowered manually without starting truck engine.

Safety features protect both operator and load. A single control lever placed on each side of truck body keeps operator out of line of traffic when raising or lowering tailgate. Built-in neutralizer instantly stops mechanism when hand lever is released. Should platform become overloaded, safety by-pass valve stops raising or lowering. Another safety valve prevents accidental closing when loaded. Mechanical latches automatically lock to hold platform in raised or lowered position.

Both ramp and platform types have a load rating in lb. from 1,200 to 2,000, and overall dimensions in inches of 84 x 28 to 90 x 52. Approximate weight of unit on rear of a truck is 725 lb.—*The Heil Co., Milwaukee 1, Wis.*

Circle 109B on Reader Service Card

Ice Crusher-Slinger Has High Output



Announced is a new heavy duty ice crusher-slinger for top or body icing of perishable produce in refrigerator cars and long-haul trucks.

Machine, known as Series 500, is available in stationary and portable types, equipped with either a gasoline engine or electric motor. It has a normal handling capacity of five 300-lb. cakes of ice per min. or 45 tons of ice per hr.

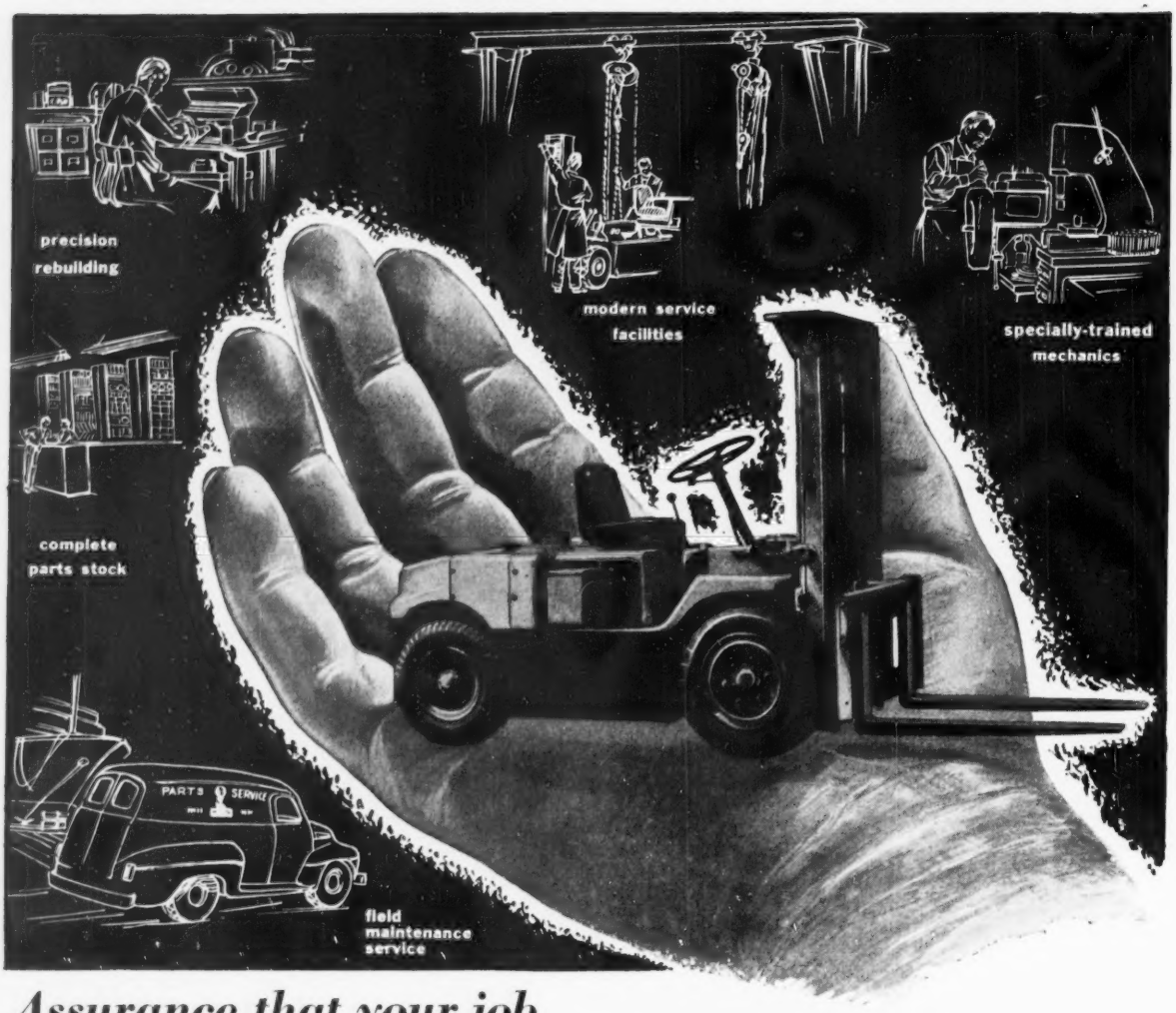
Unit crushes block or chunk ice and directs crushed snow-ice through a flexible hose over and between tiers of containers, blanketing them for protection. Spoilage is reduced to a minimum and flavor, freshness and moisture content are preserved. Slingers are equipped with a loading ramp and feeder chain conveyor for carrying cakes of ice from dock to crusher. Loading ramp hinges out of way when not in use.

Slinger spout is on a swivel head which permits crushed ice to be delivered to either side of machine without changing its position.

Portable models have three rubber tired wheels, including a swivel-type front wheel. All wheels are mounted on roller bearings. A convenient handle is provided for moving machine.—*Link-Belt Co., 307 N. Michigan Ave., Chicago*

Circle 109C on Reader Service Card

THE FRIENDLY HAND OF HYSTER SERVICE...



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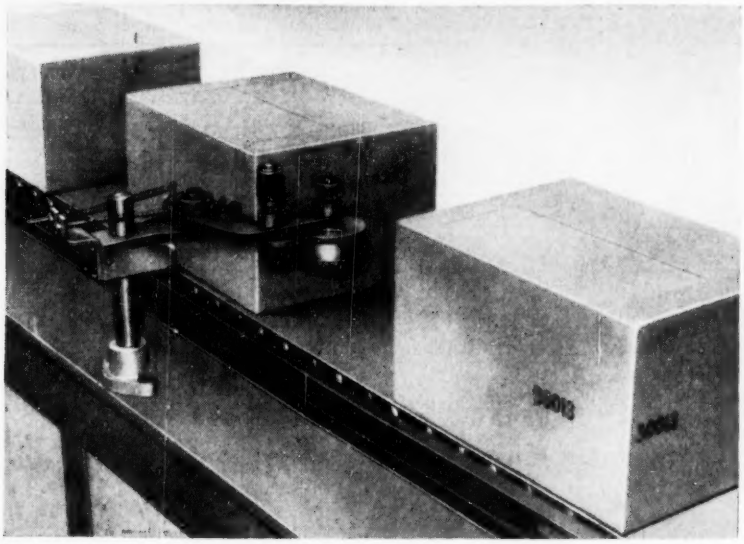
Be Sure to Call HYSTER Before You Buy ANY Lift Truck

Device Marks Shipping Cases on Two Sides



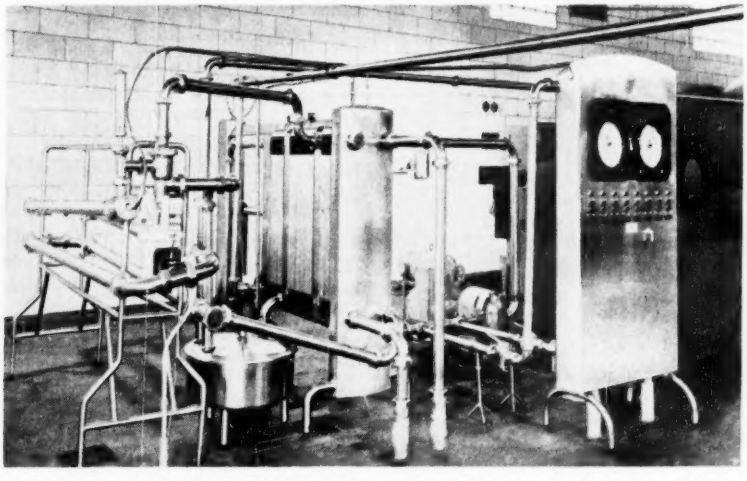
Both front and side of shipping cases are marked simultaneously with code-dates, lot numbers and other identifying marks by this new friction-operated device.

Named Rolacoder 500, it automatically imprints on both surfaces of cases as they move along a conveyor line, through a sealer or in some other production operation. Double marking facilitates case identification when stacked or palletized.

Machine automatically re-positions itself after imprinting each case so that marks on successive cases all appear in identical locations. Marks may consists of one line of copy containing up to eight letters or figures in bold ½ in. type. Copy changes, it is said, can be made in a matter of minutes and ink reservoir has a capacity sufficient for more than 8 hr. of continual operation.—*Adolph Gottscho, Inc., Hillside 5, N. J.*

Circle 111A on Reader Service Card

Heat Exchanger Is Efficient, Easy to Clean



Reduced maintenance and increased operating efficiencies are claimed for a new line of stainless-steel, plate heat-exchangers employed in heating, cooling, regenerating and H.T.S.T. pasteurizing of fluid food products.

In new unit, called the Crescent, more heat exchange surface is obtained from fewer plates and the number of gaskets, one of principal sources of maintenance, is cut in half by using one only on every second plate. Gaskets, of integral type, are bonded directly to flat outer rim of plate. Elimination of grooves in plates enables fast, thorough cleaning and helps to increase gasket life. Material resists absorption of fat and water and the action of heat, pressure and cleaning solutions.

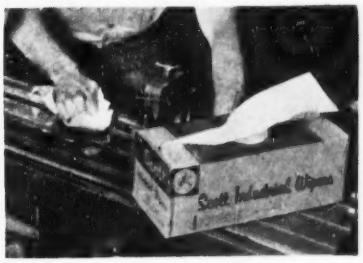
One-piece plates are of new and improved design. Crescent shaped corrugations provide thorough agitation and flow distribution with minimum pressure drop at full-opened ports which permit large volume flow. Plates are self-aligning, self-supporting and every other one is flanged. Additions can be readily made. Plates have polished finish for easy cleaning, and are specially treated for maximum corrosion resistance.

New press of unit has a heavy, steel all-welded inner wall, armored with an outer wall of all-welded stainless steel. A single center push-up that applies equal thrust over entire plate area and gasket seal makes press lock-up easy.

Units are custom-engineered in medium to large capacities, with flow rates from 5,000 to 150,000 lb. per hr., depending upon product, range and application. Hot water or exhaust steam can be used for heating, and chilled water or brine for cooling. Unit is designed to handle practically any free-flowing product, including milk, evaporated milk, ice cream and other dairy products.—*The Creamery Package Co., 1243 West Washington Blvd., Chicago, Ill.*

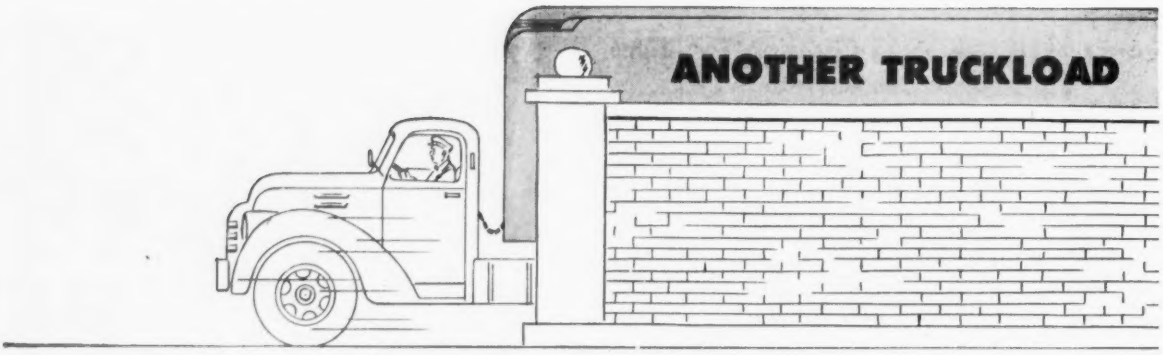
Circle 111B on Reader Service Card

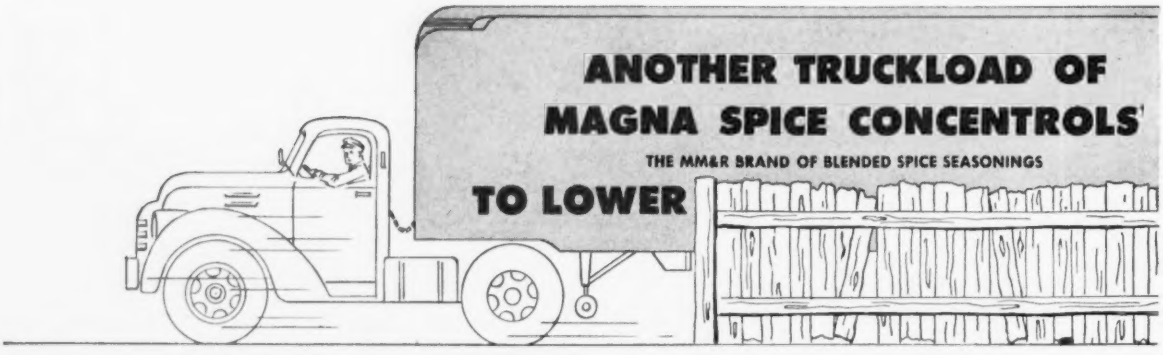
Individual Paper Wipers For Industrial Uses

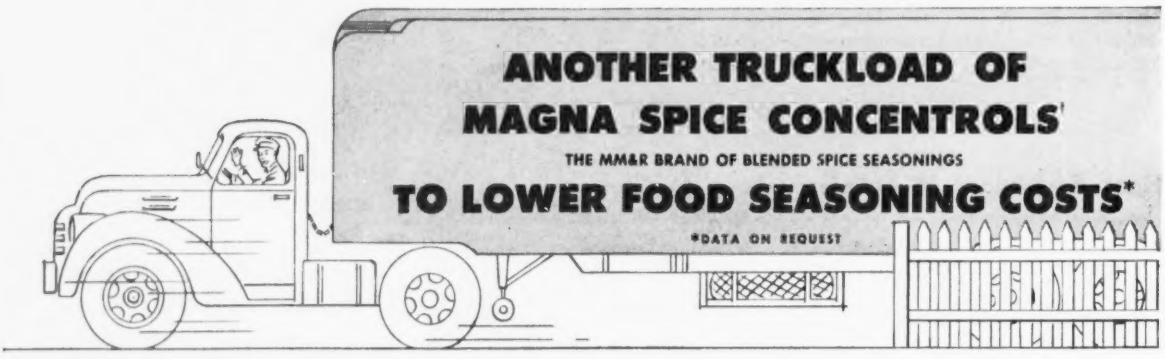


Better protection to worker, product, and machine is claimed with use of these new individual paper, industrial wipers. Clean, strong and uniform, they are highly absorbent and easily disposable.

Product is packaged in a compact size box containing 125 wipers, with 18 boxes to a case. Each wiper con-



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sists of two "Perf-Embossed" sheets welded together for durability, giving thorough cleaning action and maximum dirt retention. Chemical treatment also creates wet strength in the material.

Wiper is stated to give better health protection and help reduce employee accident rate. Compact carton takes up a minimum of space in plant and provides employees with an instant and mobile source of wipers when and where needed. Each box has "pop-up" feature that makes another wiper automatically available when one has been removed from container.—*Scott Paper Co., Chester, Pa.*

Circle 111C on Reader Service Card

Instrument Measures Flow Of Free-Flowing Solids

This new, easy-to-install, massometer measures flow of free-flowing solid materials such as grain, flour, and other cereal products.

Instrument measures mass rate of flow by determining torque produced in accelerating flow. Torque is measured by a pneumatic force-balance system and conventional pneumatic receivers indicate, record, and totalize rate in lb. per min.

Minimum capacity of present model is 225 lb. per min. Accuracy is plus or minus 1 percent from 10 to 100 percent of capacity.

Small size of unit, 24½ in. high by 26 in. wide overall, permits easy installation in tight quarters. Meter is arranged for pipe stand mounting. Inlet and outlet are fitted for 5 in. dia. spouts.—*Wallace & Tiernan, Box 178, Newark 1, N. J.*

Circle 113A on Reader Service Card

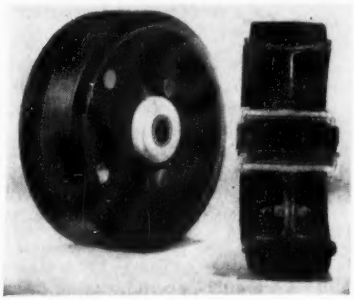
Transparent First-Aid Kit Is Waterproof, Airtight

Of interest to safety personnel is a new waterproof, airtight first aid kit. Unit is made of a clear, heavy gage, vinylite plastic with an extruded plastic slide closure called Flextite. Diagonal front closure permits case to be placed upright, upside down, or on its side without danger of opening.

Kit can be opened easily by lifting a small vinylite tab attached to closure, and closed just as readily by running a finger along its length, applying firm pressure. Bright red letters across front identify kit and point out tab to be lifted when opening. There is a small tab on back of kit which can be used to hang it on a wall. — *Johnson & Johnson, New Brunswick, N. J.*

Circle 113B on Reader Service Card

New Demountable Wheel Is Built to "Take It"



Bonded-to-steel rubber tread on an entirely new type of demountable industrial wheel is reported not to slip, stretch or creep under heavy loads.

Months of intensive on-the-job testing by 28 major industrial firms, says maker, preceded this announcement of the wheel.

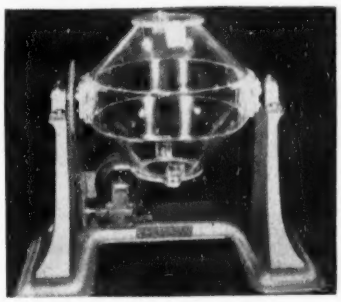
Called the "MB", new wheel incorporates design features that promise to increase industrial wheel life substantially.

Replaceable tire has a thick, live-rubber tread of uniform thickness throughout, bonded to steel inner band. A one-piece hub with retaining ridge locks entire assembly to wheel disks, preventing shifting under side thrust. Hyatt-type or Timken tapered roller-bearings are bathed in grease that feeds from an extra-large reservoir supplied by a Zerk lube fitting. Felt seals and hardened steel hub caps permanently keep grease in and dirt and water out.

New wheel is now being manufactured in 6 and 8 in. sizes with 1⅞ in. width tread in either cushion-rubber or Neoprene. Load rating is 400 and 500 lb. depending on wheel size.—*Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids 2, Mich.*

Circle 113C on Reader Service Card

Transparent Lab Blender For Dry Mix Studies



Researchers and developers of dry mixes can see what happens in the blending of their materials with use of this transparent laboratory unit.

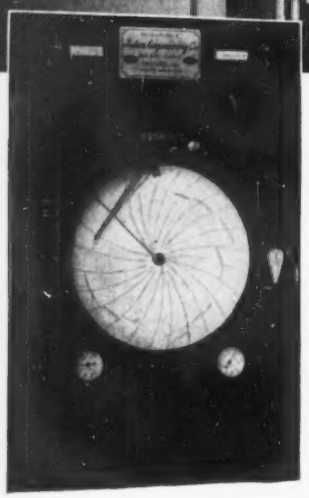
Made of clear, rigid plastic, the new blender provides the opportunity of studying the following: effects of changes in blending times; changes in consistency of raw materials; density differences; size and shape of particles; general nature, such as adherence of particles to each other or to blender walls and particle breakage.

Compact unit has lightweight aluminum frame and integrally-mounted motor drive. Blender has a 12 in. dia., a gross capacity of 0.5 cu. ft. and a batch or working capacity of 0.31 cu. ft. It is capable of blending any materials weighing up to 100 lb. per cu. ft. Unit produces same uniform blend, obtained with materials in the same proportions in large production-size conical dry blenders.—*The Patterson Foundry and Machine Co., East Liverpool, Ohio.*

Circle 113D on Reader Service Card

QUALITY Control in Smoking Operations—

—at COLUMBIA PACKING CO.'s Modern Boston Plant Is Assured by 8 JULIAN ENGINEERING CO., Smoke Houses



Super-Sensitive Automatic Control System Assures Better Meat Smoking —keeps conditions inside each smoke house perfect for fast uniform smoking.

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AIR CONDITIONING CONTROL

TOP QUALITY HAMS, BACON and SAUSAGES with all their good flavor, bloom and texture intact, helps stimulate a rapidly growing demand for Columbia's products. Shrinkage is held to a minimum by accurate regulation of the air conditioned smoke houses.

Each of the eight back-to-back smoke houses here has its own Powers recording-controller instrument adjacent to the smoke house doors. Glass inspection ports enable the smoker to quickly determine the condition of the product being processed. The appearance of the product plus the indicated processing time are observations that are made at the place where the decision to pull the house must be reached. Internal spot checks on temperature are, of course, taken prior to pulling the house.

When you want dependable temperature control for smoke houses, cooking or scalding vats, retorts, sausage steaming cabinets, drying, curing or chilling rooms, sausage casing washing, or water heaters—contact Powers nearest office for valuable aid in selecting the right type of control for your requirements.

(b36)

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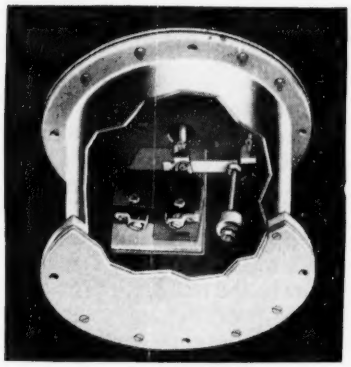
Compact Unit Indicates Bulk-Materials Level



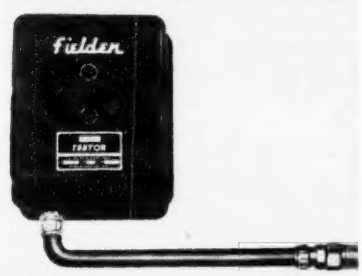
Where space limitations are encountered, this new Bantam unit can be used to indicate the level of free-flowing materials in hoppers, bins and chutes.

Over-all diameter of unit is 5¾ in. Housing permits it to be mounted on the outside of thin-walled, inside of thick-walled or multiple compartment, or suspended within bins. Its small size makes it usable on and in containers of limited size. The 4 in. flexible diaphragm is ample for requirements of such containers, and various types of diaphragm material are available for practically any free-flowing bulk material.

Diaphragm actuates a sensitive micro switch, and back plate and counterweight limit diaphragm travel to minimum required to actuate switch. Mechanism is simple—no springs or motors used, and no lubrication required. Shipping weight is about 6 lb.—*Bin-Dicator Co., 13946 Kercheval, Detroit 15.*

Circle 115A on Reader Service Card

Level-Control Instrument Is Highly Sensitive



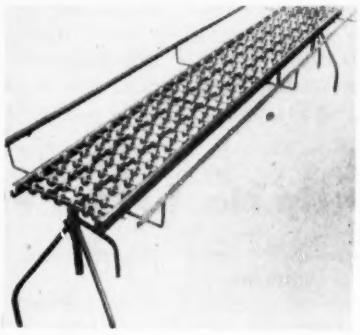
This new level control, called Tecktor, is an improved capacitance unit with no moving parts. Simplified electronic circuit operates by a change in the electrical capacitance of the electrode caused by the approach of any material that flows.

Instrument provides control as close as ⅛ in. of liquid, divided solid, interface, conducting or non-conducting, wet or dry materials. Electrodes are rigid rods or disks which may be completely sheathed in corrosion resistant material.

New Models 101 and 102 are fail-safe, low-level and high-level respectively. New features include trimmer adjustment, accessible without removing cover for simpler installation and set-up. Only a single radio tube is employed. Unit is termed stable, highly sensitive and is designed for long life with minimum maintenance. Instrument operates on 115v. 60 cycle power supply.—*Fielden Instrument Div., Robertshaw-Fulton Controls Co., 2920 N. Fourth St., Philadelphia, Pa.*

Circle 115B on Reader Service Card

Guard Rails Adjustable On Gravity Wheel Unit



On a new line of gravity wheel conveyors, guard rails are adjustable up to 5 in. on each side and adjustments are easily and quickly made by hand screw clamps.

One piece full length guard rails eliminate possibility of conveyed packages and cartons falling off, permit wide objects to overhang the conveyor section, and provide smooth flow of material.

In each wheel, seven ¼ in. carbon steel balls revolve on hardened steel raceways and cones. Wheels are grease-packed for life and are plated to resist rust and corrosion. Hook and pin connectors at ends of conveyor sections provide quick, easy set-up without use of any tools.

For greater rigidity of construction each 10 ft. section has 5 cross members welded to 2 x 1 x ⅛ in. steel channel, frame side members. Two heavy flat steel center bands are welded to cross members to provide additional ruggedness.

Non-rusting, light-weight, seamless aluminum alloy tubing is placed over full width axles to keep individual wheels in position. Conveyors are made in standard widths of 12, 14, 18 and 24 in. with 6 to 36 wheels per ft. Straight, curved, gated, and "Y" sections, and right and left hand switches, are available.—*Sage Equipment Co., 30 Essex St., Buffalo 13, N. Y.*

Circle 115C on Reader Service Card

New Chemicals

Interior Paints Have Odorless Solvents

Of interest to both management and maintenance personnel in food plants are new odorless paints in interior flat, semi-gloss, and gloss.

Key to new finishes was development of odorless solvents. Finishes now lack pungent odor present while interior paints are being applied and dried. Later, as paint film hardens, some odor is detectable but substantially less than formerly.

Many of new paints are formulated with a type of synthetic resin known as alkyd, pioneered by manufacturer over 20 years ago.

In working to eliminate odor, chemists were able to build in other improvements. Odorless whites and light tints are now more resistant to yellowing. Drying time has been reduced. Hiding has also been improved, and the new material brushes easier.

Emphasized, however, is fact that ventilation will still be necessary during application. Volatile solvents will be present though painter's nose will not tell him so.—*E. I. du Pont de-Nemours & Co., Wilmington, Del.*

Circle 115D on Reader Service Card

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In Behalf of Progress . . .

Don't Be a Victim of Creeping Obsolescence

If there ever was any doubt about the urgent need to replace obsolete equipment, the compilation of facts in our Anniversary Issue should have dispelled that doubt.

Shocking proof lies in the rapid trend to fewer and larger food manufacturing firms.

More palatable but equally positive proof is found in the multiplicity of better machines—with their generous pay-off through cost reduction.

It is fundamental that management make itself well informed as to the obsolescence of its equipment and facilities. You have to know when improvements in a machine have made your old unit an expensive luxury.

If a new way of performing an operation is giving your competitior a decided cost or quality advantage, the old way is costing you plenty. And in many instances you no longer can afford to operate old equipment regardless of competition. You often will be dollars ahead through lower operating expenses, even though you pay interest on the investment in the new.

Unfortunately, the food industry by and large has been lacking in its attention to obsolescence. Many firms in recent times have asked that a new piece of equipment pay for itself in a year. Others have allowed a "generous" two or three year write-off.

This quickie policy has its place. If the product you are to produce may have a short market expectancy, or if the new equipment is likely to be out of date soon, then short-time payoff is essential. And if you have very limited buying power and are looking for the best possible investment, it makes sense.

But otherwise, this policy can do tremendous damage to your future. It can give you a self-satisfied feeling and blind you to the fact that your plant is fast becoming a high-cost producer.

Food manufacturers often make another mistake, too, in determining when it pays to buy modern equipment. They don't take everything into account. Lower unit production costs and less maintenance usually are not the whole story.

Very often the new equipment will save heat, power, and floor space. It will be easier and cheaper to clean. It will be safer and will improve working conditions in the plant. It may require less highly skilled operators. And often it will improve quality.

Take the saving in heat. We know of an instance where an insulated continuous unit eliminated half a dozen batch kettles, each of which was throwing away about $20 in Btu.'s every day.

Food manufacturers with a comfortable profit tomorrow will be the ones which make carefully calculated replacement of obsolete equipment a basic part of their plans for the future.

Federal Fines Point Up No. 1 Plant Problem

Unpleasant information is presented in the Food & Drug Administration's monthly summary of court actions against food firms. But this information can be very profitable reading if objectively interpreted.

Take these excerpts from a recent F&DA release covering convictions in criminal cases involving violation of the Federal, Food, Drug & Cosmetic Act:

1. Soft drinks contained insects and mold; prepared under insanitary conditions. Firm fined $750; individual fined $250.

2. Bread contained insect filth; prepared under insanitary conditions; was deficient in enrichment. Sentence suspended and firm placed on probation for one year.

3. Cheese contained insect and rodent filth, cat hairs and manure fragments, and cow hairs; prepared under insanitary conditions. Firm fined $1,000 and court costs of $41.

4. Frozen breaded shrimp was decomposed; prepared and packed under insanitary conditions. Firm fined $500; individual fined $250.

These are exceptions to the general rule of clean, well-run food manufacturing plants. And they probably represent slip-ups rather than chronic bad practice.

Nevertheless the entire industry suffers when one such example of poor sanitation and quality control develops. And the guilty firms suffer far beyond the extent of the FDA penalties.

The big penalties come from angry and disgusted consumers—even when they make no formal complaint and institute no court action. Neither they, nor their friends buy the offending brand again. And the same goes for consumers who read about such cases in the daily press.

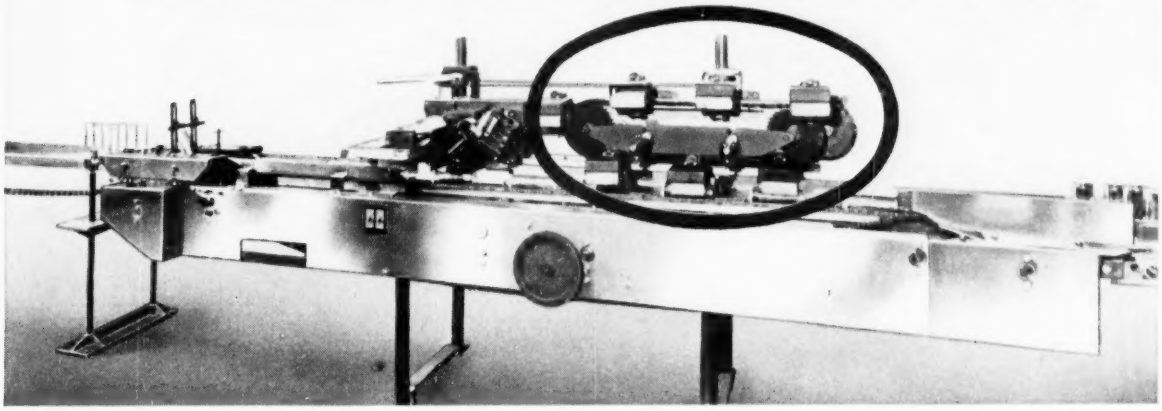
Even if there were no FDA, food manufacturers could not escape the penalty of careless operation.

So the manager of every food factory should be continually aggressive in respect to sanitation and quality control. He not only must institute sound policies and procedures, but he must be strong on the follow-through.

Employees responsible for sanitation and quality control ought to be checked regularly to make certain that they are conscientiously doing what they are supposed to do.

And alibis are not acceptable.

C-O-N-T-I-N-U-O-U-S
FLEXIBLE PRESSURE SEALING



A big advance in LABELING!

You took great pains to obtain colorful, attractive labels, for you realize how much they mean to SALES. And now you can be sure that your labels will always look their best—be uniformly smooth, free from unsightly wrinkles, firmly sealed!

The new THRIFTY LABELER gives you this important sales advantage because it applies the label by a radically improved method. The label is not merely tapped on—its entire surface is subjected to continuous flexible pressure. Leaves the machine so tightly sealed that it will withstand the hardest handling. Glue failures are a thing of the past. The containers may be hot or cold, wet or dry. Labels may be rectangular, round or fancy cut; surfaces of containers odd shaped or recessed.

SPEED—40 to 120 a minute...SIZE RANGE—from a gallon jug to a 4-ounce bottle...QUICKLY ADJUSTABLE with few change parts.

LOW COST

Low initial cost, low maintenance and high operating efficiency make the Thrifty Labeler a sure way to better profits—whether you are labeling by hand or machine.

Labels a wide variety of containers. Surfaces may be odd shaped or recessed.

THE NEW Thrifty Labeler

Write for full particulars

PACKAGE MACHINERY COMPANY

NEW YORK PHILADELPHIA BOSTON CLEVELAND CHICAGO ATLANTA
DALLAS DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.

The "How" of Instant-Coffee Processing

Popular Drink Is Product of Careful Roasting, Extracting, Drying

IN PRODUCTION of soluble coffee, green beans which are received in 132- and 140-lb. bags, and stored in the warehouse, are dumped into chutes that deliver them to storage bins.

On their way to the bins, beans are cleaned by aspiration—for removal of lighter materials—and by a rotary screen that separates larger particles—Point (1) in accompanying flowsheet.

From storage bins, the beans go to roasters. In the modern plant, these are electronically controlled units that insure uniformity of roast from batch to batch.

One system currently used employs a thermocouple and an electronic potentiometer. Any temperature change indicated by response of the hot junction of the thermocouple is recorded by the potentiometer, which then produces the required control action.

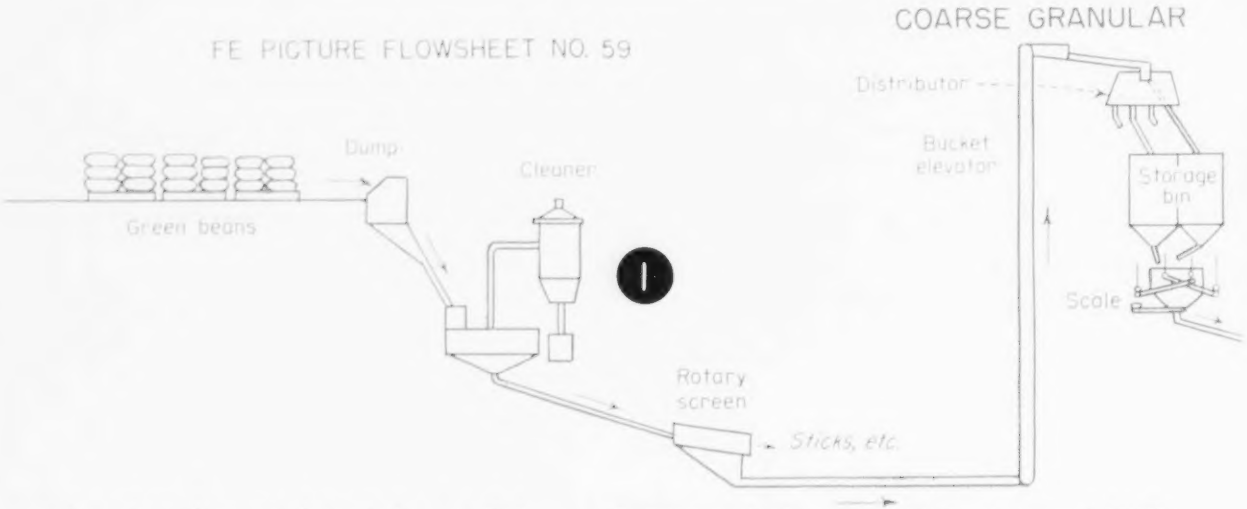
Semi-automatic control of roast is accomplished by a signal system. A warning light flashes "on" when the roast is within several degrees of completion. The operator stands by and waits for the red light, which is the end-point signal. He then shuts off the burner and quenches the beans.

In a completely automatic system, the operator simply fills the roaster and presses the "start" button. No further attention is necessary. Action proceeds as follows:

Valve for the gas supply opens and a red signal light on the control panel is energized to show that the roaster is in operation. At completion of the roast, gas valve closes and damper opens wide. End of heating period is indicated by an amber "on" light and the red "off" light. Water valve then opens and, simultaneously, a timer begins measuring the flow period for quenching. At end of this period, timer closes water valve, a green light goes on and the amber light goes off showing the end of a complete roasting period.

In some units, all smoky material from the roast is recycled through the burner, thus eliminating all signs of smoke.

Roasted, quenched beans are discharged to a cooler, where they are brought down to room temperature by an air blast. They then pass down a chute to a magnetic separator for removal of iron, and into the stoner, where the beans are lifted pneumatically (leaving stones behind) and then delivered to storage bins.



WHAT IT TAKES to produce a good "Instant" product is disclosed and explored in this month's special article, "What Makes Good Soluble Coffee"—on page 76.

Blending is usually performed at this point. Then comes grinding and extracting. System for extracting usually comprises 6-8 stainless steel percolators connected for series operation under pressure—Point 4.

Hot water—140-200 deg. F.—is pumped into the percolator containing coffee that has been most completely extracted. Following retention for 60-90 min., it flows to the next (less completely extracted) unit, and so on until the concentrated extract is discharged from the last, most recently charged percolator. Effluent may be heated as it passes from one unit to the next.

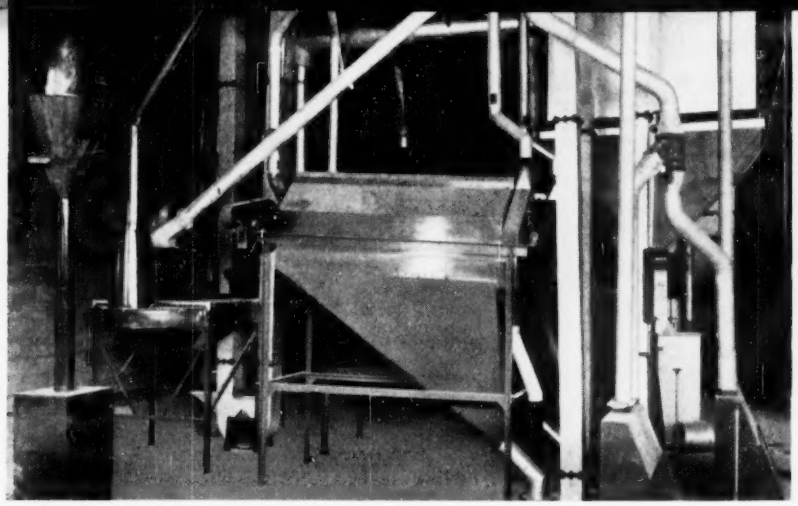
To facilitate economical dryer operation, solids content of extract should be 32-38%. Where this is not obtained in the extraction system, effluent is passed through an evaporator. Concentrate is then cooled and discharged to a blending tank.

Extracted grounds are steamed for recovery of final traces of flavor, then removed from the percolator and disposed of by burning as fuel under boilers or by dumping.

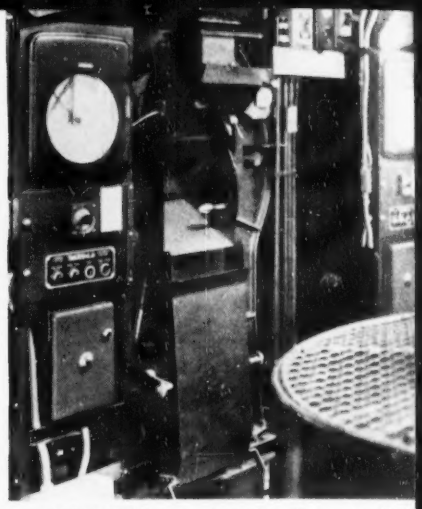
Light liquor resulting from the steaming is concentrated to desired solids content in the evaporator or in an open kettle, then cooled and added to original extract in the blending tank.

Pertinent data needed for extract yield are assembled at this point, and any adjustments, such as reduction or increase in solids, are made.

Blended concentrate is clarified by filtering or centrifuging, then pumped to the dryer for removal of moisture



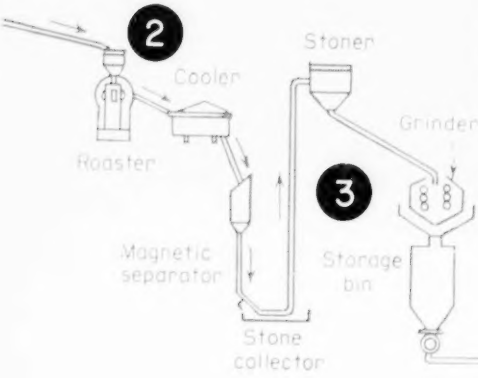
1 **ASPIRATOR** (left) removes light material from green beans. Rotary screen (center) separates larger particles. Note bean dumps right. (Jabez Burns)

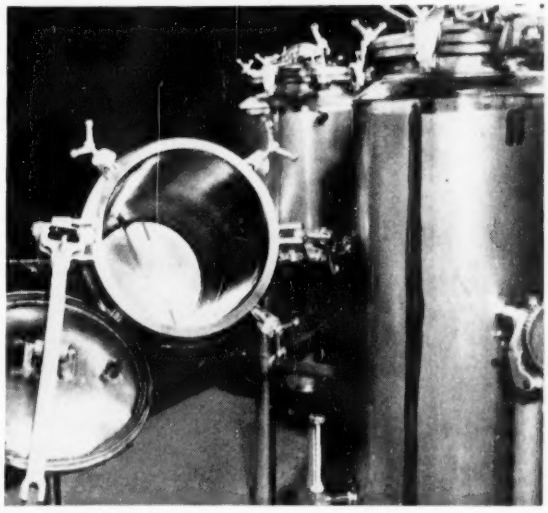


2 **ROASTERS** are automatically controlled ing. Coolers (right) remove excess bean

–Point (6). Spray units are preferred for this operation, although vacuum drum dryers and infra-red units may be employed.

Dried product is sieved, to insure uniformity in size, and packaged in drums (bulk) or jars for consumer sales. Jars are closed, labeled and cased for shipment.

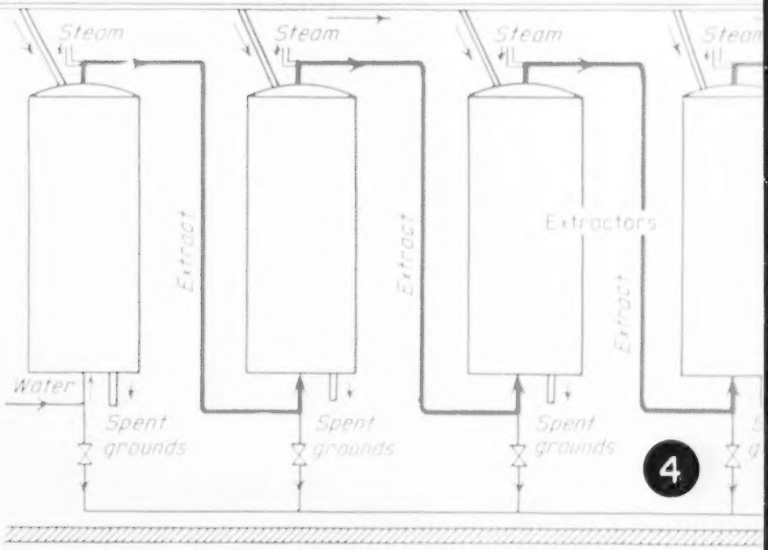




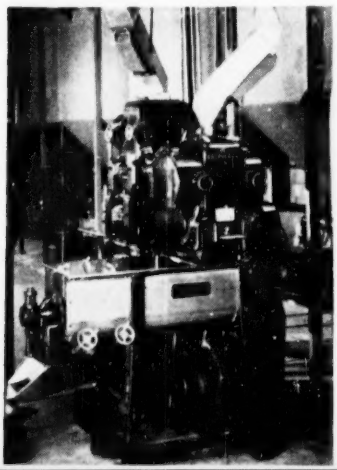
4 **PERCOLATORS** have perforated plates to support ground coffee. **(The Pfaudler Co.)**

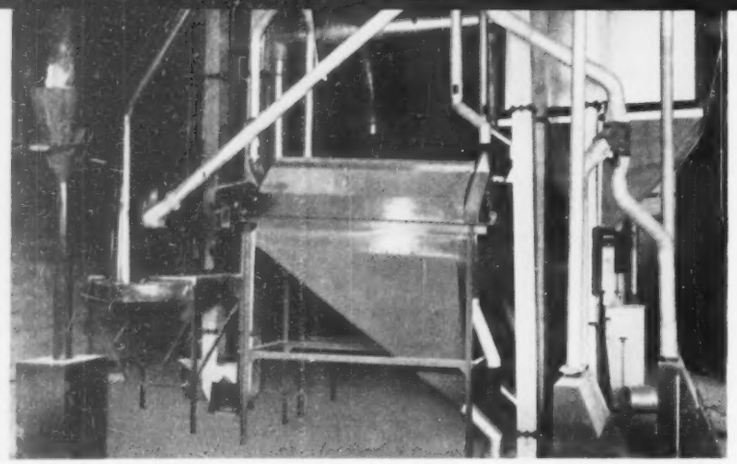
5 **CONCENTRAT** stainless tanks

FINE GRANULAR AND LI



3 **GRINDERS** employ corrugated rolls, convert roasted beans to uniform size particles for extraction. (B. F. Gump)





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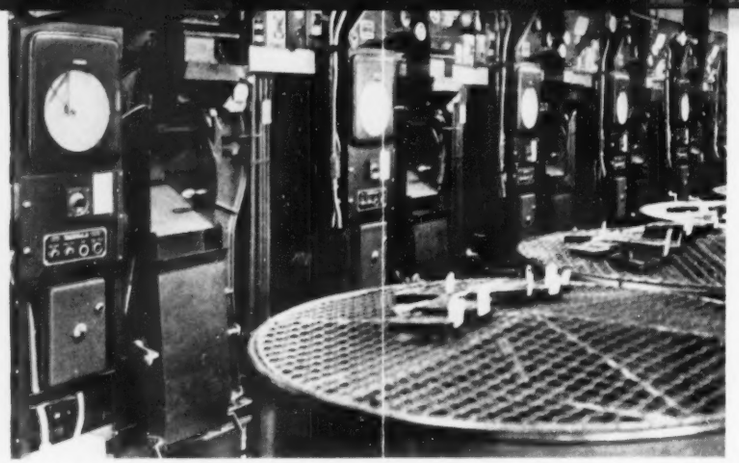
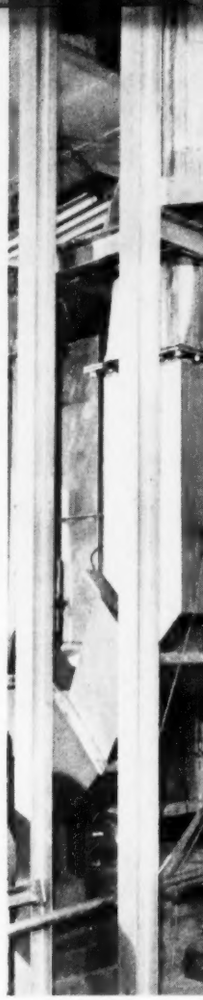


2 **ROASTERS** are automatically controlled through entire cycle, including quenching. Coolers (right) remove excess bean heat. (Jabez Burns)



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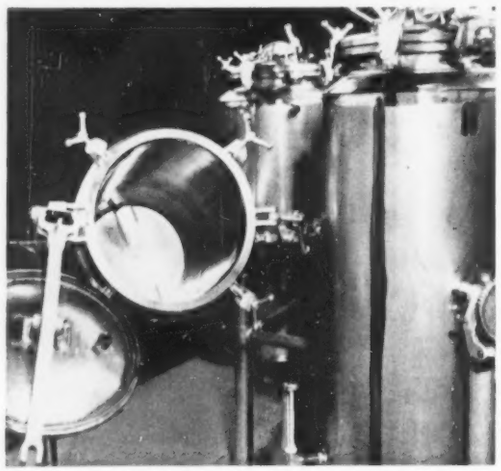

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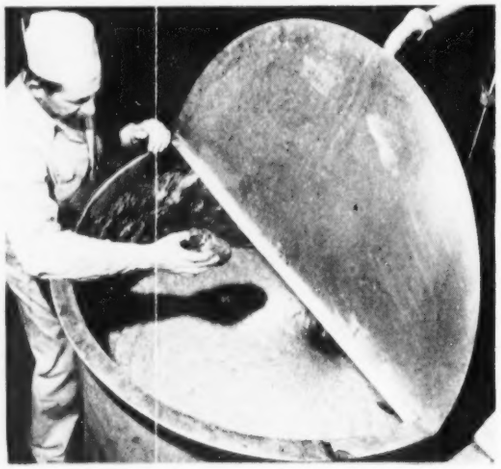
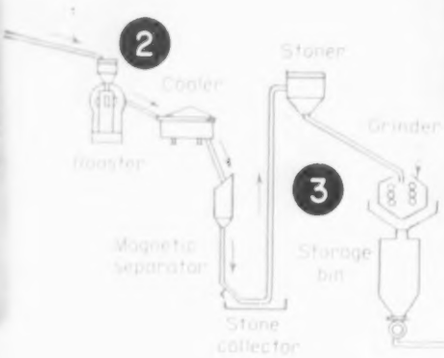
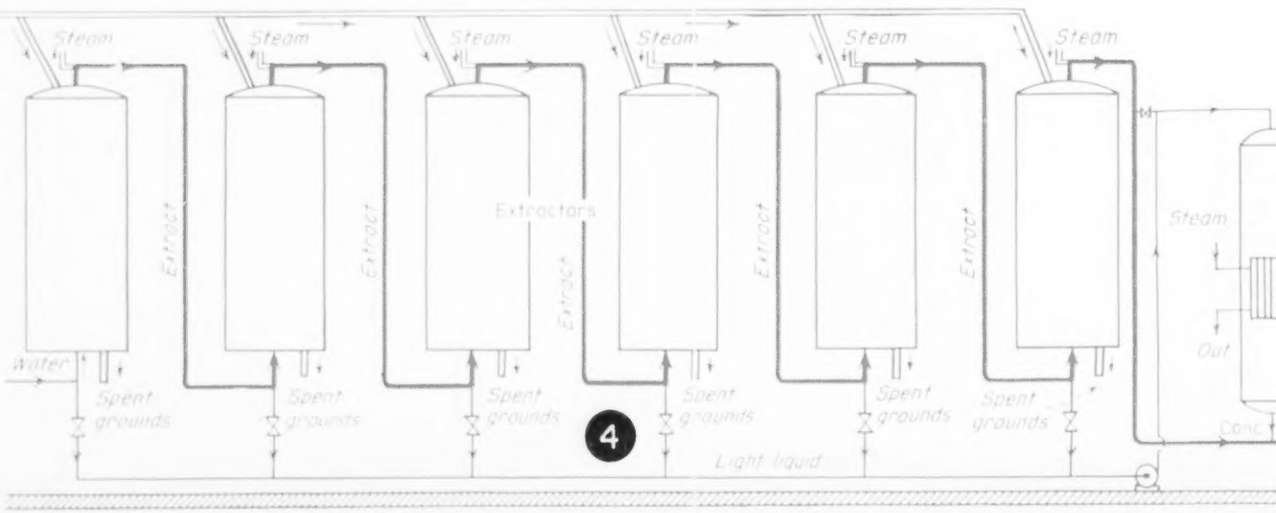


5 **CONCENTRATED EXTRACT** is cooled, then blended in stainless tanks. Tests here provide pertinent data.

6 **SPRAY DRYER** ren
shown employs cent



FINE GRANULAR AND LIQUID



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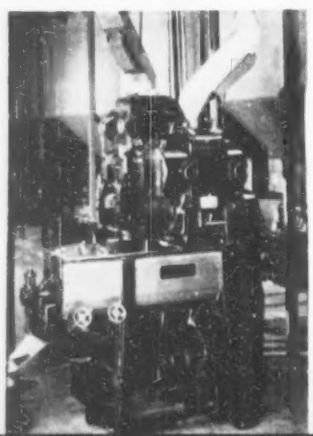
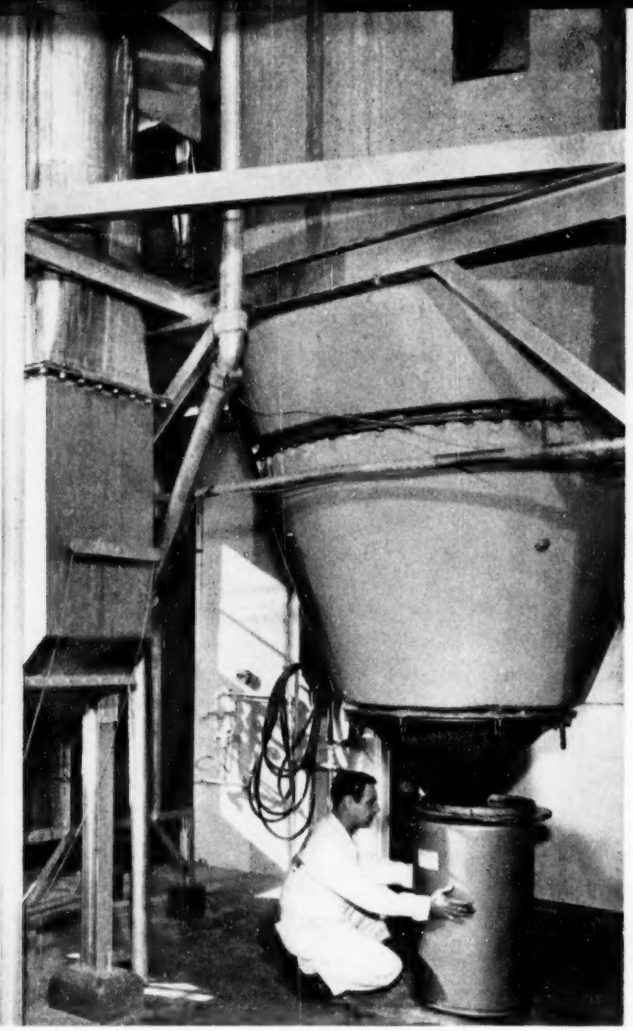
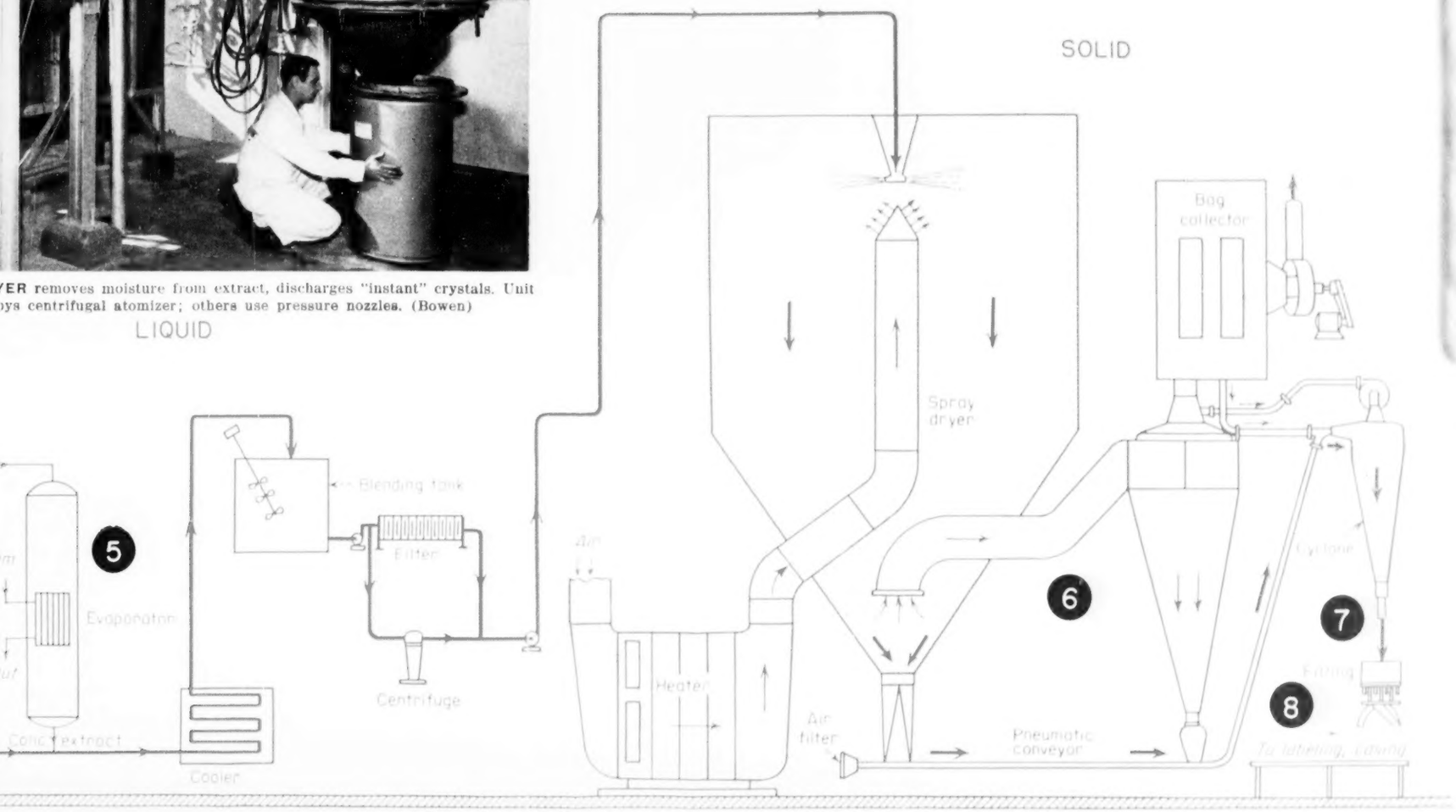




YER removes moisture from extract, discharges "instant" crystals. Unit
oys centrifugal atomizer; others use pressure nozzles. (Bowen)

7 **VACUUM FILLING** of powdered product into jars is next step. This is followed by closing with screw caps.

8 **AUTOMATIC CASER** packs closed, labeled jars into cartons. Following sealing, cases go to warehouse.



Containers that *Protect* your product ALL THE WAY

Sturdy steel drums and pails—made with care and accuracy in every detail make certain that your product quality receives protection *all* the way to its destination. They make certain that your products remain safely sealed through the various conditions of handling and shipping.

That's why J&L Steel Drums and Pails are standard packaging specifications for many leading product brands. They have proved through years of dependable service that they meet the most rigid tests for durability.

Plants for the manufacture of J&L Steel Drums and Pails are located in leading industrial centers to assure quick, efficient service to meet your requirements. Call the nearest J&L office . . . or, contact our headquarters office in New York City.

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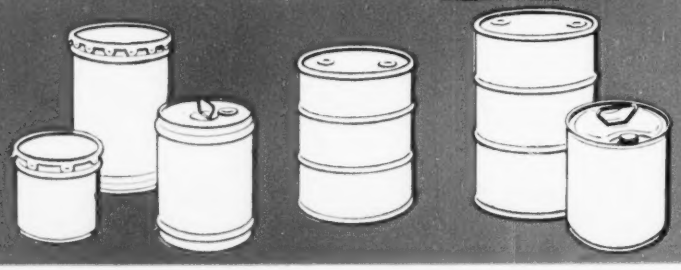
Container Division
CHRYSLER BUILDING • NEW YORK 17, N. Y.

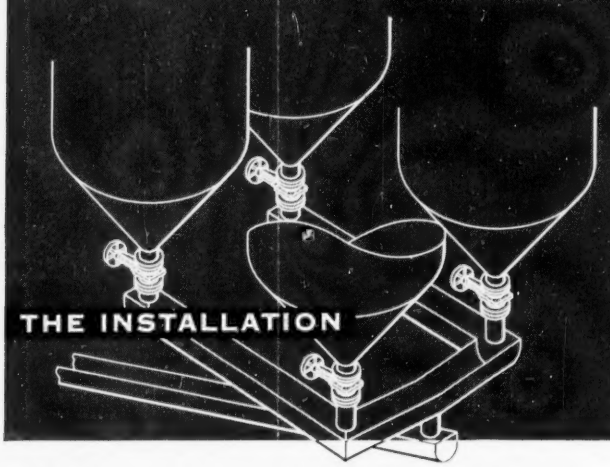
J&L STEEL

The J&L Line includes all types of Closures and Finishes. Bright, colorful decorations may be reproduced to your specifications.

• Heavy-duty ICC Drums • Light-gauge Drums • 55, 30 and 15 gal. capacity and 100-lb. Grease Drums • Lightweight Drums for Chemical and Powdered Materials • 1-10 gal. capacity Steel Pails for Foods, Chemicals, Oils.



This Valve Makes Easy Work of Piping Pulpy Foods ...like beans, for instance



At The Tom Corwin Canning Co., Lebanon, Ohio, using Crane Pulp Stock Valves at 6-inch outlets on bean-soaking tanks to processing line, as shown above.

VALVE SERVICE RATINGS

SUITABILITY:	Meets every need
FEATURES:	Unique shearing-action seating
MAINTENANCE COST:	Not a penny
SERVICE LIFE:	No efficiency loss in 10 years
OPERATING RESULTS:	No production delays-Better product
AVAILABILITY:	Crane catalog item - No. 1425

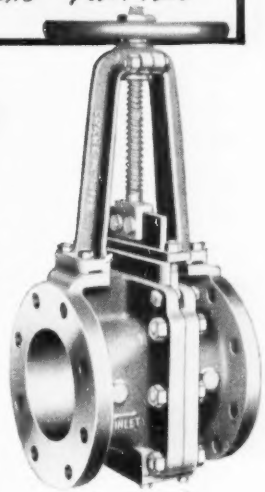
THE CASE HISTORY

This packer knew good operation of the system would depend on a clean, sanitary shut-off at the tanks as each batch of beans was released for processing. The valve selected would have to close completely, yet avoid trapping beans under the disc to keep it from jamming. There could be no pockets in the valve body where the wet beans would clog up the valve and contaminate the product.

It's now more than 10 years since Crane No. 1425 Pulp Stock Valves were put on these tanks, with each valve operated about 25 times daily. But they've done more than meet operating requirements. They've needed no maintenance, no repairs, no replacements. That's the result of thrifty buying—when quality is the first consideration.

THE VALVE

Here's the only valve with a shearing-action disc and seating design that seats completely on pulpy and fibrous fluids without jamming. It's bonnetless; has no place where solids can accumulate . . . cleans itself with flow. A famous performer in the pulp and paper industry, Crane Pulp Stock Valves in iron and other materials can be used for many similar services. Consult your Crane Catalog or Crane Representative.



THE BETTER QUALITY...BIGGER VALUE LINE...IN BRASS, STEEL, IRON

CRANE VALVES

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Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

For more information, use coupon on page 159.

6 REASONS why you should investigate this plant-site . . .

400 acres of level Burlington-owned land, free from overflow, on the bank of a major river. This ground offers an excellent location for a chemical or food processing plant. Available as a whole or in part. We will be glad to give you full information on this and other plant-sites . . . in complete confidence, of course.

1. **CENTRAL LOCATION.** Near important markets and sources of raw materials.
2. **AMPLE WATER OF EXCELLENT QUALITY.** Large-volume wells easily drilled. City water available.
3. **EFFICIENT TRANSPORTATION.** Main line rail service in all directions. Good highway facilities.
4. **ADEQUATE UTILITIES.** Good electric and natural gas service.
5. **CONVENIENT WASTE DISPOSAL**, by discharge into river or city sewer.
6. **GOOD LABOR SUPPLY.** Near major city, providing reservoir of skilled and unskilled labor. Good living conditions.

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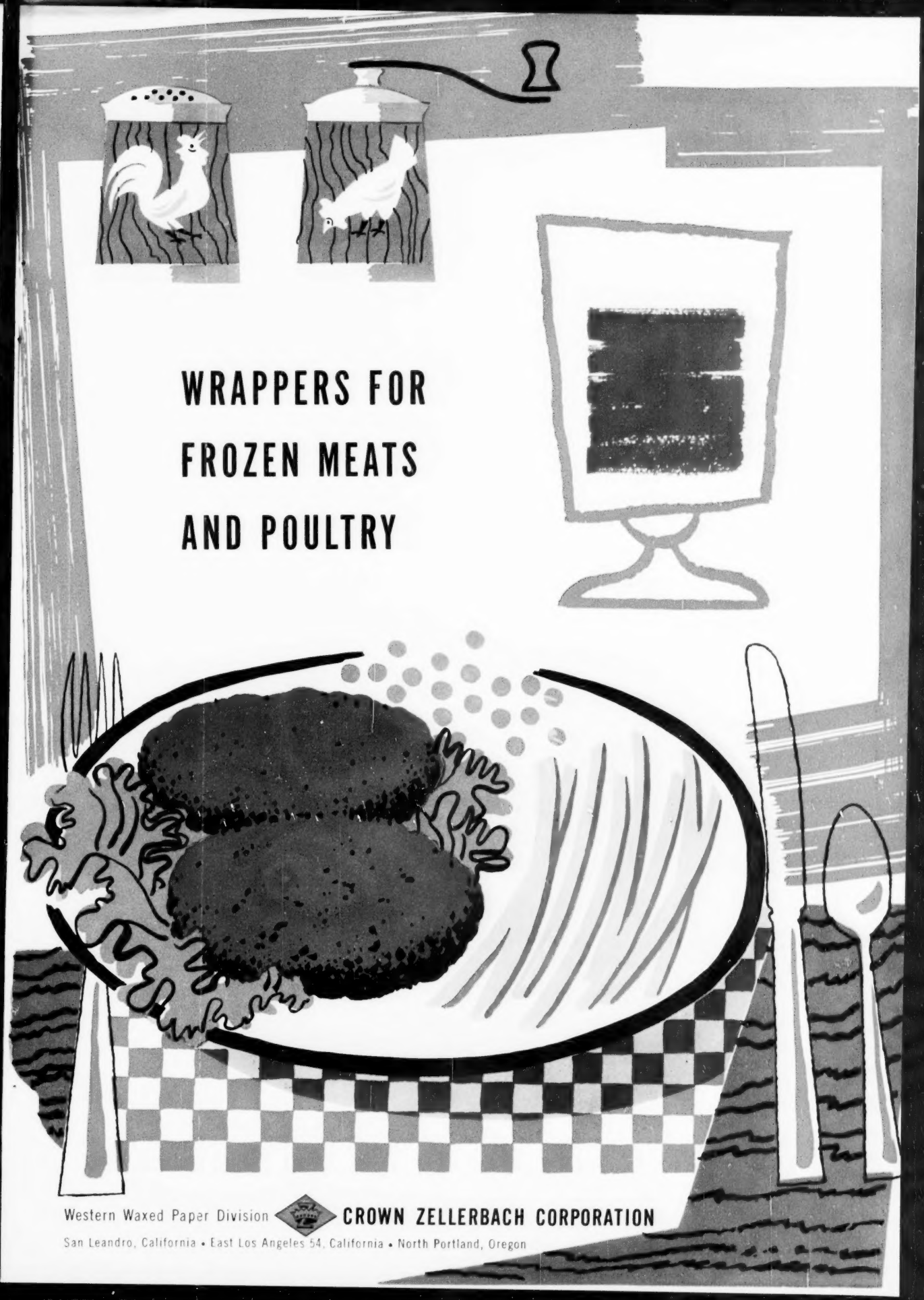

Western Waxed Paper Division CROWN ZELLERBACH CORPORATION

San Leandro, California • East Los Angeles 54, California • North Portland, Oregon

STOP Product Contamination from unprotected shipping containers!

Use U·S·S DRUMS . . . protected by a special new cleaning and finishing process

THROUGH a recently developed method of cleaning and treating drums, U·S·S Products has solved the problem of product contamination due to scale, dirt, grease and rust which plagues users of shipping containers. This special process not only cleans the drum of contaminating materials, but also retards rust and corrosion. In addition, the bond formed between the coated steel surface and the paint makes it possible for us to give you a longer-lasting, better-appearing decorated container.

Key to the U·S·S Products process is in the fact that a rust-inhibiting, finish-protecting coat is applied *after* the drum parts have been cleaned, completely descaled and formed—just prior to final assembly of component parts. As a result, you get drums that can more effectively withstand severe handling and weathering. Your products remain pure and uncontaminated by scale and other residues. This is better for you . . . and better for your customers.

LOOK AT THE DIFFERENCE PROTECTION MAKES!

The drum at left is an ordinary painted drum. After exposure to weather for one year it is badly rusted; in fact rust was very apparent after only *one week*. The drum at right is a U·S·S Drum. It, too, has been exposed to weather for a year . . . yet there is absolutely no rust on this drum!

The handkerchief test proves the superiority of a U·S·S Drum. When the interior of an ordinary drum is wiped with a handkerchief, the handkerchief will pick up grease, dirt, scale and rust, as shown in photo at left. But the photo at right shows the cleanliness of the U·S·S Drum . . . the handkerchief remains absolutely clean!

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DIVISION
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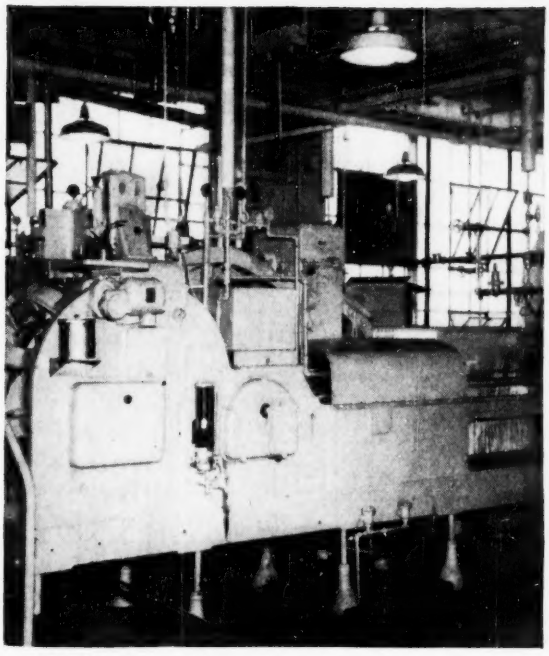
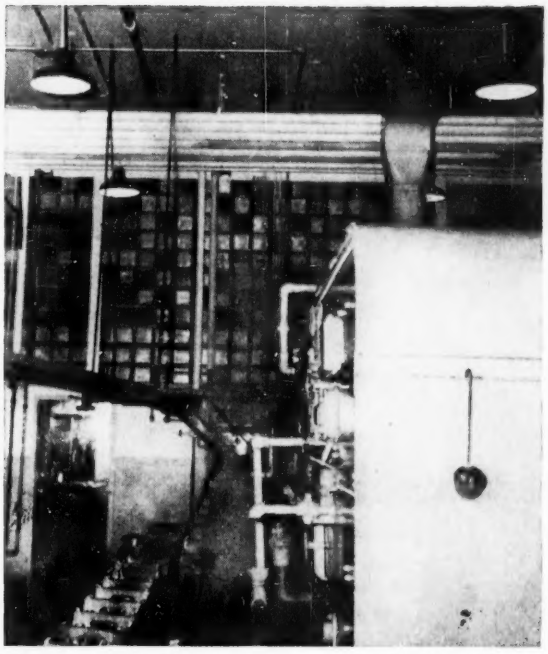
USS

UNITED STATES STEEL



INEXPENSIVE, easily applied epoxy-base paints have proved tops for this paper-bottle forming and filling machine, and adjacent room surfaces.



BOTTLE WASHER (right), exposed to strong caustic and high temperatures, is coated with acrylic-resin paint. Epoxy finish was used on pipelines, panels.

Painting *With Fewer* Repeats

—is saving plenty of dollars at Hood. Credited for new minimal man-hour system: Special resin-base coatings for walls, ceilings, equipment, piping

FE STAFF

Careful paint formulations that meet specific service conditions have enabled H. P. Hood & Sons, New England's largest producer of milk and dairy products, to maintain top standards of cleanliness and appearance at lower costs.

Reduction in the expenses is credited to a notable lengthening of the intervals between re-paintings. And the company hails utilization of new resins for achieving this advantage. Similar benefits are indicated for many other food processing plants.

Decision to swing to resin-base paints was made three years ago following special patch tests conducted by the company's painting department. In each case, a section of a wall or ceiling or a portion of a piece of process machinery was selected so that the trials would be under actual service conditions.

On the exterior of the big bottle-washing machines, vinyl coatings are used, while walls and ceilings of the room are treated with an acrylic-resin paint.

But most widely used are the new epoxy coatings based on the Epon resins (Shell Chemical Co.). These, according to the maker, offer not only great versatility but also monetary savings.

The per-square-foot costs are stated to run well under those of the acrylics and vinyls.

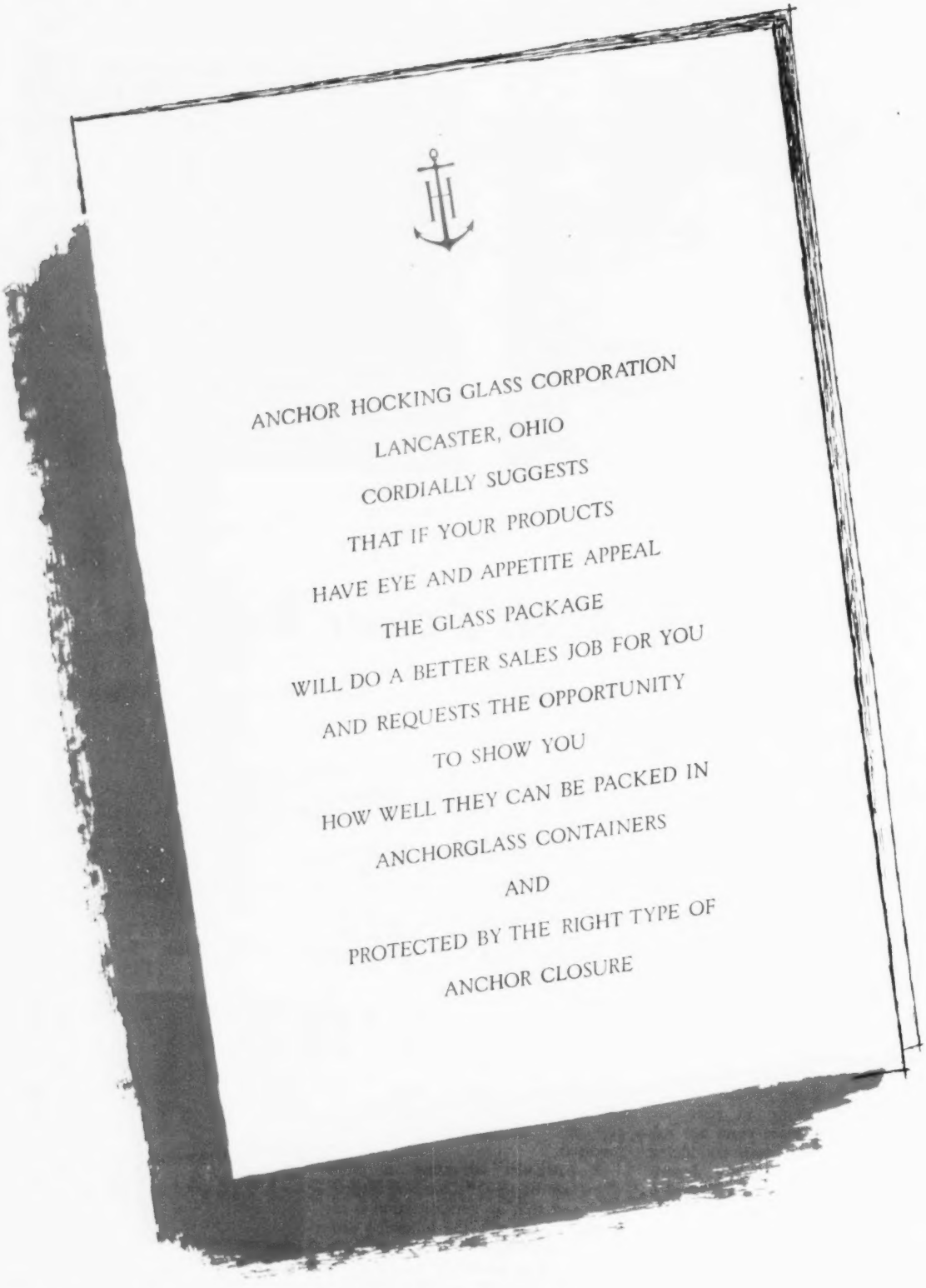
Epoxies are used on the walls and ceilings of offices, in the labs, and on pipe and machinery, as well as walls and ceilings in bottling and processing rooms. They are applied over steel, plaster, brick, and cement. Except in the case of steel, no primer is required.

A particular advantage is cited when painting new plaster or cement—the fact that no neutralization is required. Formerly, the following procedure was used: (1) Zinc sulphate neutralization coat; (2) sealer; (3) undercoat, and (4) finish coat. But with the new finishes, Hood finds that two coats do the job, thus halving labor costs and completely eliminating cost of the neutralizer and the sealer.

Because the plants are in practically continuous operation, seven days a week, all painting must be done with brushes. And here, the epoxies, with their freedom from bubbling and from offensive odors, are in high favor with the painting crew. Surface prepara-

(*Turn to page 153*)

OFFICE area surfaces are painted biannually with epoxy coatings.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THAT IF YOUR PRODUCTS
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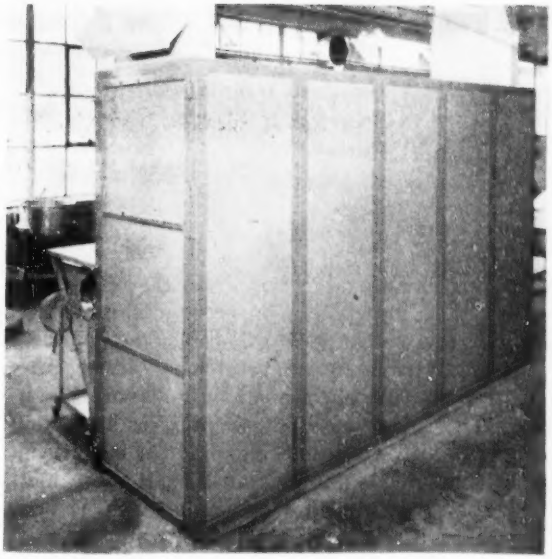
WILL DO A BETTER SALES JOB FOR YOU
AND REQUESTS THE OPPORTUNITY
TO SHOW YOU
HOW WELL THEY CAN BE PACKED IN
ANCHORGLASS CONTAINERS
AND
PROTECTED BY THE RIGHT TYPE OF
ANCHOR CLOSURE

Production zooms to new high when Milwaukee company speeds process with continuous air dehumidification. And the old summer-humidity shut-downs are now "out"

E. W. GIFFORD
District Manager, Zintel, Hyfield & Co., Milwaukee



COMPACT Kathabar. Automatically and continuously it circulates low-moisture air (only 20 grains/pound) to dryer unit. Rate of flow: 675 cfm.

Halves Batch-Drying Time

Through an advanced dehumidification technique, time of the task of lowering moisture content of vitamin powders has been cut in half—from 48 down to 24 hr.—at Vitamin Products Co., Milwaukee.

Further, year-'round operation is facilitated, despite the adverse influence of high summer humidities.

Employing lithium chloride, the drying method is of special significance in that it permits humidity to be maintained at the level determined by the engineer as best for the particular operation, independent of atmospheric conditions.

Similar benefits of stepped up production rates and steady output around the calendar through air dehumidification are reported in a number of other food processing branches.

Accurate control of humidity and temperature at pre-determined levels now allows continuous frost-free operation of low-temperature processes in breweries, candy and meat plants.

There are other applications, too, such as supplying low-dewpoint air to dry filtration-plant pipe galleries, also ship cargo holds.

In preparing its vitamin concentrates, the Milwaukee company dries and blends extracts from fruits and vegetables that are in powder form. Then the blend is compressed into tablets, that are finally packaged.

All drying is conducted in a batch-type tunnel dryer designed by the firm. Trays of the blended-powder granules are placed on racks in the dryer, and then dry air of about 100 deg. F. is circulated throughout.

To assure satisfactory compression in the tableting machines, the 30% moisture content of the powders (before drying) must be lowered to the 5-to-6% level. And as stated, a complete operation cycle now takes only about 24 hr. employing the chemical dehumidification technique, whereas the former method required approximately 48 hr. even under the most favorable conditions.

Dehumidifying Steps

A "packaged" dehumidifying unit is the crux of the VPC operation in extracting excess moisture from the air recirculated from the dryer. Tradenamed the Kathabar dehumidifier (Surface Combustion Corp.), it delivers dried air to the supply duct with 20 gr./lb. moisture content.

Of course, carryover of any moisture-absorbent material into the vitamin concentrates could not be tolerated, and on this score use of the Kathabar was found most pertinent, with no carryover.

In operation, 675 cfm. of air, recirculated from the dryer at 93 deg. F. and 56 gr./lb. (25% r.h.), is introduced to the washer section of the package unit. Here, the air passes through a flood of the moisture-absorbent lithium chloride-base solution, while both simultaneously pass over cooling coils through which 23.5 gpm. of 70 deg. water are pumped.

It is a unique property of lithium chloride solution that the lower its temperature, the more moisture it will absorb. Thus the water, acting as a coolant, establishes the temperature of the solution and the amount of moisture removed from the product in the drier.

Now cooled to 77 F. and dehumidified to 20 gr./lb. (15% r.h.) air is delivered to the duct supplying the dryer. But before entering, the air passes through an afterheat coil, where its temperature is raised to 103 deg. F. (6.5% r.h.) by 20 lb./hr. of 5 psig. steam.

Regeneration of Absorbent

Intermittently and automatically, as the absorbent solution becomes saturated with moisture, a small quantity is pumped into the regenerator section of the package unit. Here, the solution is sprayed over low-pressure steam coils, giving up excess water to a scavenging air stream that purges it to the outside. Now restored to its proper strength, solution is returned to the air washer section for further dehumidifying passes. Consumption runs 55 lb./hr. of 5 psig. steam in the regenerator section, for total moisture removal of 15.6 lb./hr.

REMEMBER WHEN Monosodium Glutamate WAS A HORRID WORD?

NOT MANY YEARS AGO monosodium glutamate was the ugly duckling of the food processing industry. Its name lacked sales appeal. Just plain homely. Its reputation wasn't too well established either. The government even called it artificial flavoring and seasoning. Though food processors were becoming aware of its value in enhancing and holding natural food flavors, they were reluctant to put it on their labels. Consumers shied away. Remember? It was a horrid word. Now, only a few years later, this large Ac'cent plant at San Jose, California, has been expanded for the second time to keep up with the demand for monosodium glutamate.

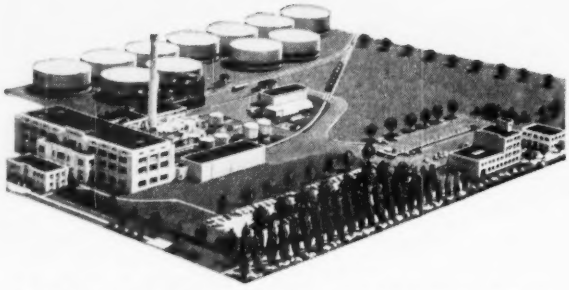
Well, what happened? What changed the buying habits of millions of housewives? What made it possible for food processors to put out better tasting products and thus win more customers, more *repeat sales?*

A few years ago, 1947 to be exact, Ac'cent launched an educational campaign. It was the first serious attempt to tell producers and consumers about the benefits and value of monosodium glutamate. It is a continuing program... the most extensive to date. It has been so successful and so effective that consumers now not only accept monosodium glutamate on labels, they *look for it!*

Like the housewives' attitude, the government view changed, too. It was influenced partly by the Ac'cent educational campaign and partly by our research work which has greatly extended knowledge of this remarkable food product.

Ac'cent has carried on research since 1946 on almost every phase of monosodium glutamate—new uses, practical application methods, uniformity of crystals. Most of the information that exists has been developed by Ac'cent, whose sole job is the making of pure monosodium glutamate. As a result, no other manufacturer of monosodium glutamate has such a vast and complete store of scientific information on the subject—much of it unpublished.

No other manufacturer of monosodium glutamate has the invaluable technical service that Ac'cent can make available to you. Our 75-man research and development staff is ready to help you immediately with specific solutions to your specific problems, even to the point of designing new machines.



World's Largest Plant Producing Monosodium Glutamate Exclusively. San Jose, California

This service, of course, is yours for the asking—one of the extras you get with Ac'cent's always dependable crystals, the most standard and uniform in the industry.

Many of the leaders in the food industry already have used our facilities. In fact, a list of our customers would read like a Who's Who of the food processing industry. And an important thing to remember is that many of them are becoming leaders after consulting and working with Ac'cent technical service people.

To meet their growing needs, our customers are assured of a steady supply of monosodium glutamate—for Ac'cent, the world's largest producer of pure monosodium glutamate, has convenient warehouse stocks located in every key market. The expanded capacity of our plant at San Jose is further insurance against a possible supply shortage.

The next time you order monosodium glutamate, specify Ac'cent. You get so much more when you do.

NORTHEASTERN DIVISION
61 Broadway
New York 6, N. Y.

MIDWESTERN DIVISION
318 W. Washington Blvd.
Chicago, Illinois

WESTERN DIVISION
214 Front Street
San Francisco, California

SOUTHEASTERN DIVISION
460 Mellview Avenue, S.W.
Atlanta, Georgia

EAST-CENTRAL DIVISION
90 Hamlin Avenue
East Aurora, New York

SOUTHWESTERN DIVISION
6339 Royal Lane
Dallas 30, Texas

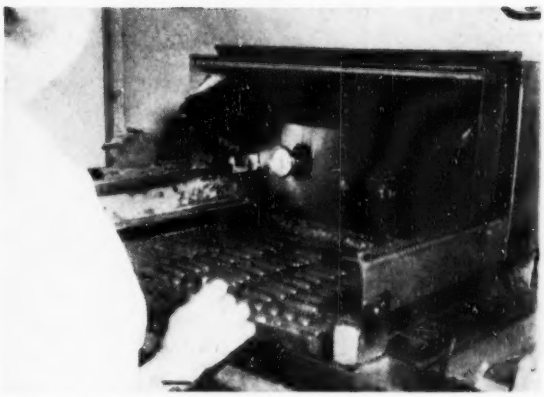
MID-CENTRAL DIVISION
5085 Balfour
Detroit 24, Michigan

EASTERN DIVISION
c/o P. T. Mackie & Company
31 South Calvert St.
Baltimore 2, Maryland

Ac'cent®
PURE MONOSODIUM GLUTAMATE
...makes good food taste better!

AMINO PRODUCTS DIVISION OF INTERNATIONAL MINERALS & CHEMICAL CORPORATION, 20 NORTH WACKER DRIVE, CHICAGO 6, ILLINOIS

Simple "1—2" Does It



MINIATURE chocolate-dipper machine coats 300 lb. of chocolates a day. Operator loads pieces onto plaque (left photo), which is conveyed to unit (right photo) for complete coating of centers with chocolate.

Abolishes Hand Dippers

Operated by one girl, small low-cost unit coats same number of chocolates as used to be turned out by three girls

FE STAFF

Little candymakers like Osker's, in Plainfield, N. J., no longer have to hand-dip candies to apply a chocolate coating.

A miniature dipper now performs this operation, with appreciable savings.

Recently developed by Le Roy's International Research Laboratories, Point Pleasant, N. J., this inexpensive unit is only 48 in. long. Included are an automatic conveyor and a built-in bottoming device for coating bottoms of centers with extra chocolate.

At Osker's, this midget Peppy Dipper is handling 300 lb. of chocolate an 8-hr. shift—an operation that now requires only one girl to equal the former output of three hand-dippers. What's more, dipping-labor costs have thus been slashed from about 22 to 10¢ per lb. of chocolates. Cost of operating the machine is about 75¢ a day.

Readily portable, the machine can be moved to any area where the temperature is suitable for hand-dipping. And once the chocolate is melted to 88-90 deg. F., the machine can be operated all day without need of adjustment.

Temperature of the chocolate, as it is distributed in curtain-like fashion onto the centers, is accurately maintained by thermostatically controlled forced air. Additional protection against temperature fluctuations during dipping is assured with a disappearing Lucite cover that drops down once the centers enter the machine. ▶ **In this way, experienced help is not required to juggle temperatures.**

The temperature features are notable improvements over the former hand-dipping method requiring 150-lb. capacity tanks that were not thermostatically controlled.

How Little Unit Performs

Operations start by loading about 120 lb. of chocolate coating into an electrically heated, thermostatically controlled, water-jacketed tank. About 15 min. later, when the chocolate has been melted, the centers are ready for coating.

The operator now loads 80-100 centers onto a plaque on a 12x24-in. canvas-belt conveyor. As the plaque-load of centers enters the dipping unit (within the Lucite cover), it is automatically transferred onto a stainless steel lattice conveyor (12x24 in.).

An extra layer of chocolate can be applied to the bottoms by operating the bottomer before and after dipping the centers. Each time, the bottomer is raised by a hand-operated lever so that bottoms momentarily float in a ¼-in. layer of chocolate.

Actual dipping is carried out in this manner:

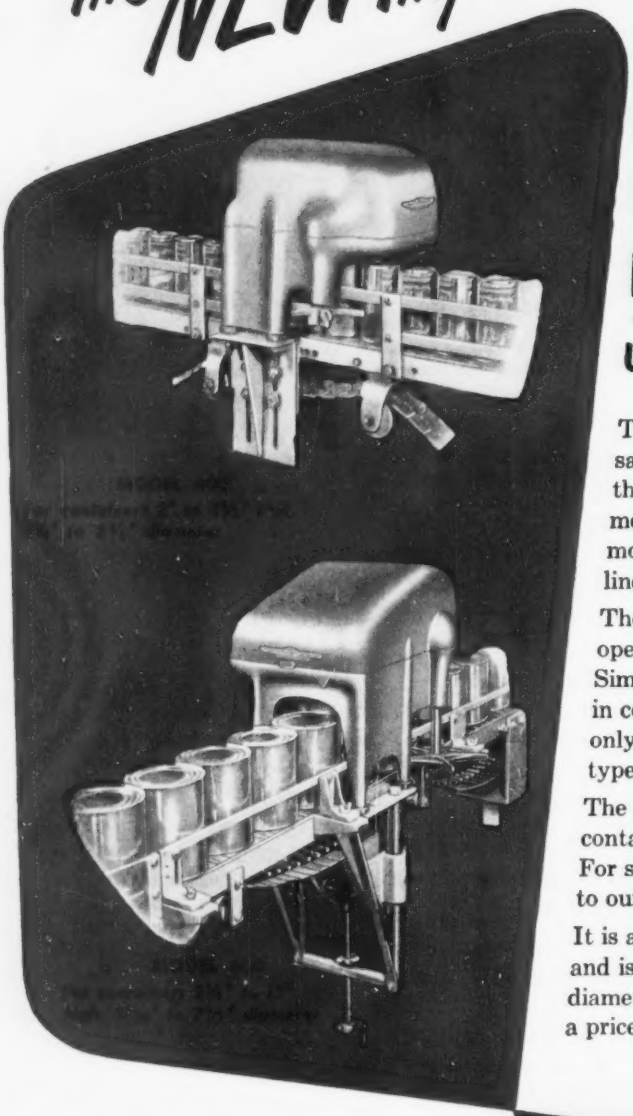
Melted chocolate is fed to an 8 lb.-capacity distributing or flow pan by a vertical, rotating bucket wheel, with buckets on opposite sides. As the wheel routes, it picks up chocolate from the melting tank. When the wheel reaches an upside-down position, the chocolate is emptied into the flow pan. The buckets clear its edge, but centrifugal force throws the chocolate outward and into the pan.

The flow pan rides on a pair of pinions and racks. To coat the centers, the operator merely turns the pinion shaft to move the pan back and forth. In this way, centers are first coated with a wave of chocolate from one direction, then with another wave from the opposite direction to prevent leaky goods. An agitator inside the flow pan mixes the chocolate in much the same manner as the hand-dipper beats it up in a puddle. Also, the agitator forces the chocolate onto the centers at approximately 45-deg. angles.

Both the distributing pan and melting tank can be removed within a few seconds. This means easy cleaning and, equally important, the machine can be quickly changed over from a dark to a milk chocolate.

A shaker attached to the lattice-type conveyor removes excess chocolate from the centers before they leave the dipping machine and are transferred onto another belt to allow the chocolate to set. Excess chocolate flows into the melting tank.

The NEW Improved BRUCEWAY MARKER



Requires NO Power
Operates At Any Speed
Marks Cans and Containers
up to 7½" Dia. and 12" High

The new Bruceway Marker makes substantial savings in production time, labor and ink costs through the use of an entirely new stamping method. The Marker is actuated by the movement of the containers along the conveyor line with no other power required.

There is no restriction as to speed — the Marker operates as fast as containers move along the line. Simplified design and sturdy construction results in continuous operation with no down time; only five minutes a day is required to change type, check ink and lubricate.

The Bruceway Marker handles straight sided containers, either glass or cans, with metal tops. For sidewalls other than straight, submit samples to our engineering department.

It is adjustable to conveyor widths up to 8 inches and is adjustable to various container heights and diameters. The unique design makes possible a price that is less than conventional equipment.

For high speed marking with valuable savings in costs it will pay you to write for Bulletin No. 304 with complete information. Address Dept. 210.

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BARRY-WEHMILLER MACHINERY CO.

4660 WEST FLORISSANT AVENUE • ST. LOUIS 15, MISSOURI

-308

"Pulling a Vac" Protects Franks

Makes snug-fit pack that not only safeguards quality but also provides all-over visibility

BERT RABINOWITZ
Vice-President, Colonial Provision Co., Inc., Boston

Vacuum-packed all-beef frankfurters—both skinless and in natural casing—are now being turned out on our new Cry-O-Vac packaging line. Speedily, too. For the rate is running 720 of the 1-lb. units of franks hourly.

We made thorough laboratory, field, and market tests on these vacuum-packed frankfurters. And on the basis of our findings, we proceeded to adopt this method of packaging, for five reasons:

- **Franks hold up 5 to 6 weeks under refrigeration without evidence of spoilage.**
- **Longer shelf-life enables retailers to safely carry a full stock of Cry-O-Vac wrapped frankfurters in refrigerated cases without loss of sales appeal.**
- **Shrinkage and discoloration of product are curbed.**
- **Visibility enables the consumer to get an overall look at every frank in this unusual, eye-catching package.**
- **Risk of mold or slime is checked because wrap clings tightly to the contour of the frankfurters.**

Working in cooperation with Dewey & Almy Chemical Co., Cambridge, Mass., our new packaging line has been set up to operate in this manner:

Three girls weigh six franks to a pound, line them up in a row, and then stuff them into a Cry-O-Vac bag. Packages are then fed to a 1x12-ft. rubber belt conveyor that carries them past four vacuumizing-clipping machines. Here, attendants on each machine operate gooseneck-shaped nozzles that pull a vacuum on each package.

This vacuuming involves clasping the bag's open end around the nozzle of a pipe, which is hooked up to a pump below the conveyor. Then, by operating a foot pedal, about 15 in. of vacuum is drawn and the bag then twisted and transferred to the air-operated clipper directly back of the gooseneck nozzle.

Clip-Closing

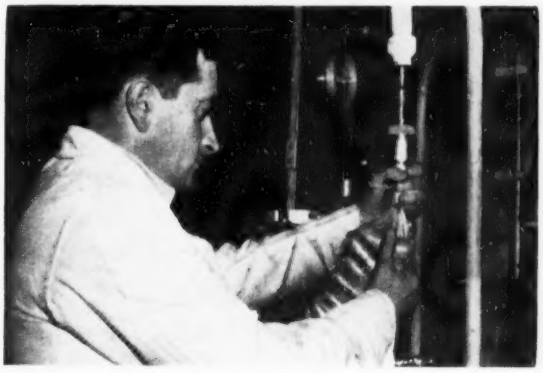
The twisted end of the bag is fed into the open jaws of the semi-automatic clipping machine. By operating another foot pedal, a pneumatically-driven, horizontal piston drives the jaws and an aluminum clamp together to seal the bag. Clips are fed clockwise from a reel containing 1,000.

Excess packaging material beyond the sealed clip is removed by a stationary knife.

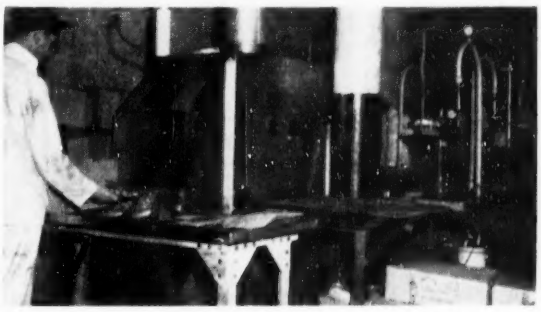
Bags are then replaced on the conveyor, which delivers them into an enclosed shrinker. A 2-sec. treatment with 210-deg.-F. water from sprays results in an approximate 25 percent shrinkage of the bags. And, as a result, a tough, skin-tight, transparent wrap is formed over the frankfurters. Excess steam from the shrinking tank is removed through an 8-in. duct by a 10-in. dia. exhaust fan.

4-Step "Quickie" Shows How

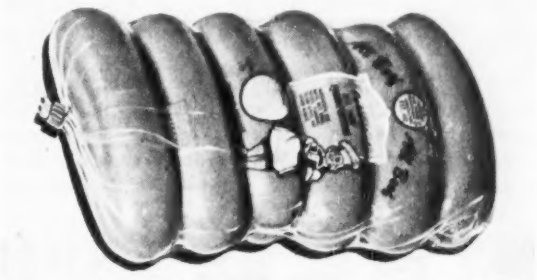
1 **FRANKFURTERS** are weighed six to pound, arranged in a row, then inserted into Cry-O-Vac bags.



2 **BAG** is clasped around vacuum nozzle and air is sucked from it. Then bag is sealed with aluminum clamp.

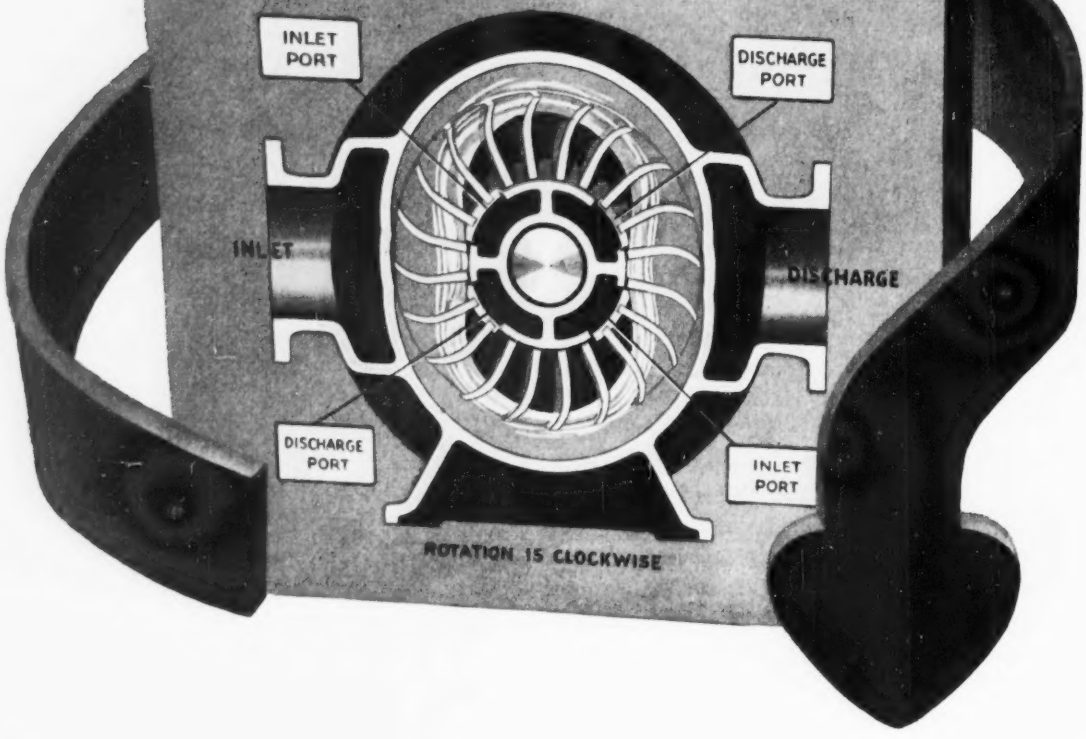


3 **CONTACT** with hot water in this unit shrinks bag to skin-tight wrap that prolongs shelf-life of franks.



4 **FINISHED PACKAGE** that provides franks with extra protection and clear-view eye appeal.

Nash Instrument Air Compressors deliver only clean air, free from oil or dust, and without filters



Here is Why!

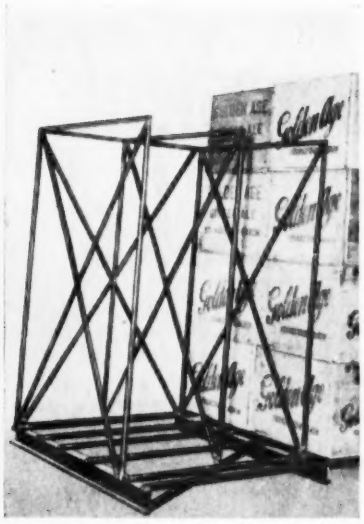
You can dispense with oil filters and dust filters when you install ©Nash® Clean Air Compressors. You can save the cost of maintaining these devices. You can greatly reduce instrument maintenance costs. For the Nash employs no internal lubrication, therefore no troublesome oil is in the delivered air. Moreover, air from a Nash is thoroughly washed and cooled as it passes thru the pump. Dust in the plant atmosphere, even fly ash, is immediately removed.

©Nash® Clean Air Compressors are simple, with only one moving element. No valves, gears, pistons, sliding vanes, or other enemies of long life and constant performance complicate a Nash. No aftercoolers are needed. You will find it profitable to investigate these pumps, now.

No oil filters.
No dust filters.
No internal lubrication to contaminate air handled.
No internal wearing parts.
No valves, pistons, or vanes.
Non-pulsating pressure.
Original performance constant over a long pump life.
Low maintenance cost.

NASH ENGINEERING COMPANY
395 WILSON, SO. NORWALK, CONN.

JULIUS DARSKY, Golden Age Beverage Co. president, points to revamped chassis, integral part of new low-cost delivery system.



WELDED PIPE compartmented pallet holds 4 separate flavors, sizes.

Loadings Sped by

"Take-'Em-All" Pallet System

Soft drink bottler develops partitioned pallets for multiple flavors and sizes. Results: Gets more on truck. Loading and unloading time reduced to few minutes. Stop periods shortened

FE STAFF

Time of loading and unloading its delivery trucks has been cut more than 90% by Golden Age Beverage Co., Inc., Akron, Ohio, by a newly developed pallet system. And similar benefits are seen for other food companies.

The new system is built around two important innovations: (1) Special partitioned pallets made of pipe, and (2) low-slung trucks.

Licks "Flavor Bottler" Problem

In common with other bottlers of multi-flavor and assorted size bottles, Golden Age has each of its trucks carry 20-30 different size bottles and flavors. This prevented enjoyment of the advantages of standard palletized operations, which have contributed so greatly to reduction in delivery costs for single-flavor manufacturers.

But, after months of experimentation, a system was developed that overcomes the difficulty inherent in the standard pallets. Now in operation several months, it has met with an enthusiastic response from the driver-salesman. And besides reducing truck loading and unloading time over 90%, there are these additional benefits:

- **Driver check-in time has been cut more than 70%.**
- **Efficiency of drivers has materially increased.**
- **Customers get better and faster service.**
- **Morale of drivers is higher, since the system shortens their work day.**

The new method uses special partitioned pallets. Measuring 36x58 in., these units employ ruggedly welded ½ and ¾-in. pipe. Each has four compartments for as many different flavors and sizes.

Truck chassis were revamped by lowering the frame in front and in back of rear wheels (with extension of rear section) to provide pockets for the new pallets, six of which comprise a load for a 2-ton job.

Pallets are pre-loaded in the plant as they move down a conveyor line past stacks of cases of various flavors and sizes. Here, compartments are filled according to orders prepared by drivers before starting on their routes in the morning.

Filled pallets are discharged on the loading platform. When a truck returns to the plant with pallet loads of empty and filled bottles, the fork-lift truck operator removes these pallets and re-loads the truck with filled ones. Checking of returns is quick, and driver proceeds immediately to the cashier's office to settle up.

Returned pallets proceed through plant on the conveyor line, where cases of empties are removed at the washer and filled ones added to make up the next load.

This pre-loading arrangement is an even greater time-saver in hot weather, when it becomes necessary for a driver to return for a second load. He can call the shipping department and place an order for immediate processing. Upon arrival at the plant, the lift-truck operator removes pallets of empties and replaces them with fulls. Previous tie-ups for re-loading are completely eliminated.

The new system is seen specifically applicable to other food processors handling a number of different items in single loads.

Ingredient for Sales-

Clean-Looking PERVENAC* Dry-Labeling

Your label sells when your brand is on the market shelf. When you use clean-looking PERVENAC Dry Labeling, your product sells the way you want it to: *fast.*

PERVENAC *Dry-Labeling* paper eliminates glue handling and clean-up problems, adhesive smears, and "bubbles". Because it gives you a clean, *neat* job, you have fewer rejects, less re-labeling. Labeling speeds range from 30 to 360 units a minute.

You can't beat PERVENAC for food labeling, from salad oil to sausage. It goes on — and stays on — almost any material, wet or dry: plastics, metal, film, glass, paper. Ask your printer to get samples today from his Nashua paper merchant. Nashua will also be glad to send you a copy of the booklet: "Label Impact". Write for it today.

*Registered trademark. Manufactured under U. S. Patent No. 2,462,029.

Look on the shelves, where the shopper looks. Popular brands match *product* quality with *label* quality — that means PERVENAC.

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Everything in Flexible Packaging that Sells

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Jet Freezing

—*Continued from page 61*

stream gradually changes from an elliptical to a circular section.

When the drag effect from the ends finally reaches the center line core of the air movement, a third phase develops. The center line velocity decreases as the distance in the continuous expansion of a circular jet.

Finally, the center line or axis velocity decreases exponentially with distance during a fourth phase, where adjacent walls limit the air expansion. Such walls cause entrained air to be obtained by recirculation from the airstream itself instead of from the quiet air.

Where walls occur, the conditions of free expansion into quiet air occur close to the jet orifice; but the presence of walls exerts preponderant effects on flow conditions farther away. Air flow conditions with side walls differ from those of similar jets discharging into large, open spaces. Because the angles of expansion are smaller, entrained air is not drawn from a quiet atmosphere but is obtained by recirculation of jet air, and the length of the jet is not infinite but is limited by resistance to flow on the return path of the air circuit.

If excessively high jet velocities are discharged into this type of stack, the air stream will reject the air passages for horizontal flow through the boxes and will accept the easier return and re-entraining flow vertically up the pressure pocket and out over the stack.

Therefore, it is necessary to reduce velocity by the braking action of entrainment so that an efficient pressure pocket may be developed for the horizontal flow of air through the piling. When proper jet-pump and entraining action is developed, the system becomes very flexible, and irregularity in the height of piling is allowable. Although the chimney or pressure pocket may vary in height, the braking action of entrainment tends to equalize flow where the stack walls are not present as in irregular piling.

In jet designs where the air-flow issues from a very long slot (infinite length), only the first and second phases of jet pattern are present. This occurs because there is no air drag proceeding toward the center line velocity from the ends. However, the fourth phase is also present if the discharge is between parallel walls. In the case of a slot of finite length, discharging into a conduit, all four phases may be present; but, the third phase would be absent if the air expansion encountered wall effects before entering the third phase. In the

free expansion of a circular or square jet, only the first and third phases are involved because the encroachment of the entraining air drag around the jet is the same from all directions.

The *velocity ratio* of a jet is defined as the ratio of the center-line axis velocity to the discharge velocity. The *velocity ratio* and the *entrainment ratio* are practically independent of the velocity of discharge. Conditions that increase velocity ratios generally increase entrainment ratios. As the area of a jet increases, there is a tendency for velocity ratios to increase, since a longer time is taken by the entraining air to work its way into the core velocity of the jet.

Increased jet size also reduces entrainment ratios, since a longer time is taken for all of the secondary air to be affected by the center line of the jet. The small jet quickly yields its center-line velocity to the entraining encroachment. Finally, increased turbulence increases entrainment ratios, since the turbulence causes mixing which puts the center-line velocity momentum into contact with the outer layers of air.

McElroy[10] has shown that entrainment ratio is related to distance of throw from the jet expressed in effective jet widths. This latter quantity is computed as the square root of the jet area. This curve (Fig. 8) gives the relationship between entrainment ratio and effective jet widths for jet pump action into the piling system (Fig. 1) used in air blast freezing of poultry and other commodities. (McElroy's paper deals with the effect of the size and shape of pipes and of adjacent walls on velocity and entrainment ratios. It was developed in certain air-flow tests at the discharge of fan-pipe lines in mines.)

Geometric Jet-Pump Relations

Gosline & O'Brien[11] have presented important data on the design and proportioning of water jet pumps. Their calculations were further modified by the studies of the Buffalo Forge Co.[12] These data present three types of jet pumps. The first is one in which the very highest type of streamlining and proportioning is employed—the exception and not the rule. The second type is one in which ordinary construction and production may be involved with a good mechanical job, well streamlined, and well proportioned.

The third type, developed by Gosline & O'Brien, is a high friction type in which certain suction and discharge restrictions, including check valves, elbows, etc., were considered for their resultant effect in decreasing the efficiency of the jet pump. Data for this third type have been valuable in guiding the approach to the air-blast freezing system with jet pumps.

The total area of the jets at discharge should run from 10 to 12% of the nominal area of the pressure pocket. Expressed as a formula—

$$\frac{\Sigma WD}{TL} = 0.10 \text{ to } 0.12 \qquad (2)$$

where

W is width of nozzle outlet
D is length of nozzle outlet
T is width of pressure pocket
L is snug length of pressure pocket (not including pile growth).

The angle of jet spread is defined (Fig. 1). In order that a workable, "soft" pressure pocket may develop, the geometry of the pile relationship must meet the angle of jet spread, which is effected and controlled by the relationship between the width of the nozzle and the width of the pressure pocket. Furthermore, the distance from the nozzle to the pressure pocket must be sufficient to allow the required induction of secondary and recirculated air.

Air Flow Factors

When the geometrical and induction requirements are satisfied, the pressure pocket will give positive, gentle feed through the piling without fourth phase back-spill of jet air. It is advisable to develop the pressure pocket slightly above the top of the pile so that outward flow across the top of the packages will develop in a positive manner. When this condition is realized, a "dead spot" develops above the piling. Air flow above the dead spot flows *toward* the jet, while air flow below the dead spot flows *outward* over the packages from the high pressure area of the pressure pocket and its cushion stratum at the top of the piling.

The entrainment relationship is indicated in Fig. 8. The effective widths of jet throw are computed by the formula—

$$S = \frac{H}{\sqrt{WD}} \qquad (3)$$

where

S is effective widths of jet throw for a given entrainment
H is minimum jet throw distance to the top of the pressure pocket of the piling

When the value of H is greater than the value developed from considerations of Fig. 10 and formula (3), the desirable cushion stratum will be developed.

In jet-pump action, the jet will assume an angle of spread in degrees of—

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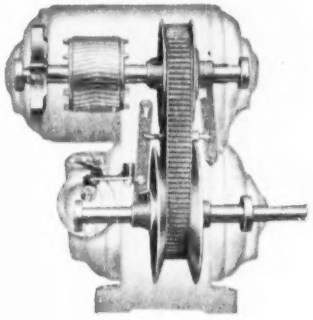

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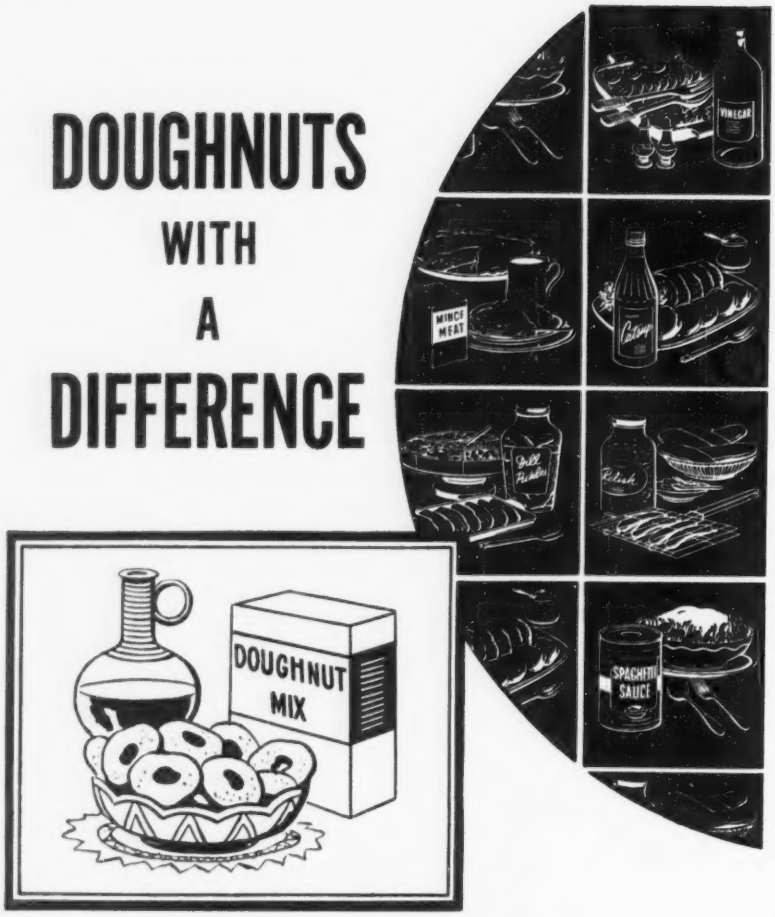

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$$21^\circ\left[1-\left(\frac{W}{T}\right)^{1/3}\right] \qquad (4)$$

This relationship has been developed from correlation of field tests and McElroy's analysis.

With T, W, and H set for the induction required, the following equation (also shown in Fig. 1) must be satisfied:

$$\mathrm{Tan}^{-1}\left(\frac{T-W}{2H}\right) = 21^\circ\left[1-\left(\frac{W}{T}\right)^{1/3}\right] \qquad (5)$$

In the tests, the velocity issuing from the jets was approximately 4,000 fpm. The entrainment ratio was 1.53. The following justification computations follow from the test data:

Step 1. From Equation (2)

$$\frac{\Sigma WD}{TL} = \frac{4\times 4\times 24}{16\times 240} = 0.10.$$

Step 2. From Fig. 10, the effective width for an entrainment ratio of 1.5 is 4.5. Substitution in Equation (3) yields

$$H = 4.5\times\sqrt{4\times 24} = 44 \text{ in.}$$

Step 3. Equation (4) shows

$$21^\circ\left[1-\left(\frac{4}{16}\right)^{1/3}\right] = 21^\circ(1-0.63) = 7.8^\circ.$$

Step 4. From the trigonometry of the jet relationship to the pile,

$$\frac{T-W}{2H} = \frac{16-4}{88} = \mathrm{Tan}\ 7.8^\circ.$$

Step 5. Since the angles of Step 4 and Step 5 are identical, the pressure pocket starts to develop at 44 in. below the nozzle.* The actual test distance from the pile to the nozzle was 47 in.; but definite outflow existed across the top of the pile in the cushion stratum developed below the dead spot which occurred at approximately 43 in. below the nozzle.

Power Requirements

A recent design provides for a jet duct 40 ft. long with a 15-hp. fan operating against a total net pack of 40,000 lb. Four of these ducts are serviced with 22 ceiling type blower-evaporators, each of which employs three ½-hp. fans for a total of 11 hp. to the evaporators. Since the rate of power consumption in these fractional horsepower fans is relatively high, the equivalent horsepower may be considered as 15 hp. based upon 3,000 Btu. per hour per horsepower. Therefore, in terms of usual horsepower consideration, the power consumption of four jet ducts plus the necessary evaporator fans is 75 hp. for a pack of 80 tons. This gives a ratio of 0.94 hp. per net ton of poultry.

In certain high velocity tunnel designs, a minimum of 10 hp. would be required with a 20 ft. jet duct to force air longitudinally in a horizontal direction through one pass of the piling size used on one side of a 20 ft. jet duct. In this case, the net weight of the product would be about 4.25 tons, and the horsepower-weight ratio would be 2.35 hp. per ton.

The energy of the fans enters the freezing tunnel or refrigerated space as electrical energy and is converted into heat and mechanical energy. Therefore, the mechanical equivalent of heat of the horsepower must be removed by the refrigerating system. The jet-pump system accomplishes the freezing with a low rate of air circulation and a consequent low rate of power input. Therefore, the cost for power, equipment, and refrigeration is greatly reduced in the jet-pump system.

In a comparative mood, one might reflect that there is no necessity for a 10-ft. aqueduct to carry away the water of a small spring that will not fill a 2-in. pipe; and there is doubtful economy in employing a heavy air blast when heat transfer from the product is controlled by the rate of surrender by the product in "oozing" heat transfer to an air movement which is properly maintained above a lower critical minimum velocity.

Economies Seen

The ceiling type evaporator-blower appears to offer great economies in combination with the jet-pump system. Refrigeration of the primary air alone is not economical, since primary air will probably be about 40% of the total pack flow, and the change in air temperature passing through the refrigerating coils must be 2½ times as great where only 40% of the air flow is chilled.

With the effective blast temperature (refrigerated room temperature) remaining constant, the suction temperatures at which the refrigerating equipment would be forced to operate would be depressed unduly low if all refrigeration were applied to the primary air. This system in which refrigeration is applied to both the primary air and the secondary air is desirable and economical. It allows simple and efficient arrangement of evaporator units at a considerable saving in first cost and power input.

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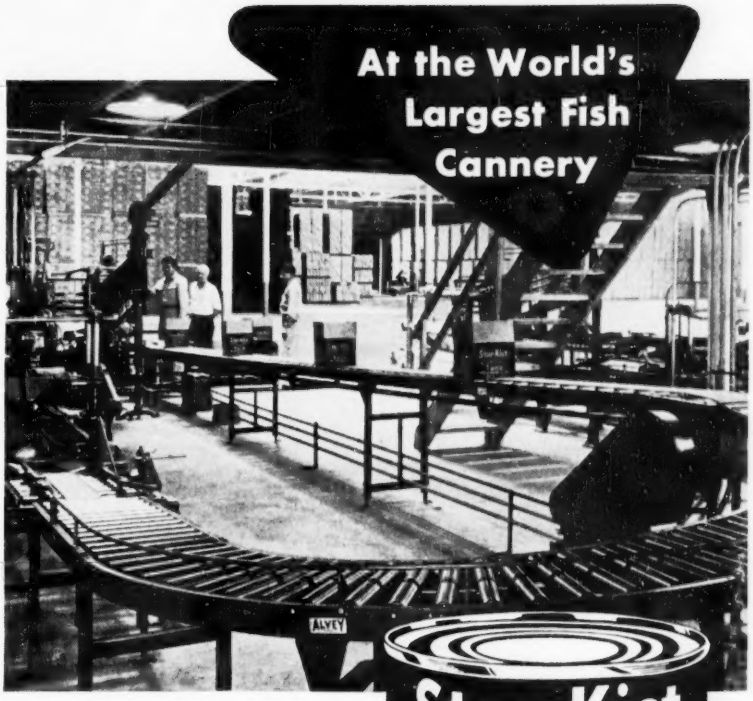

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End (Resume reading on page 62)

Centralized Lubrication

—*Continued from page 83*

3. A bearing lubricant film can be maintained constantly by the control possible in timing the frequency of lubricant replenishment.

4. Each bearing is certain to receive the intended lubricant in the predetermined quantity and at the specified time interval by means of the selective setting of the pressure developed by the central pump, sufficient to positively force lubricant to the bearing.

5. Contamination of lubricant is eliminated when dispensing from an original refinery container through the sealed injector circuit direct to the bearing.

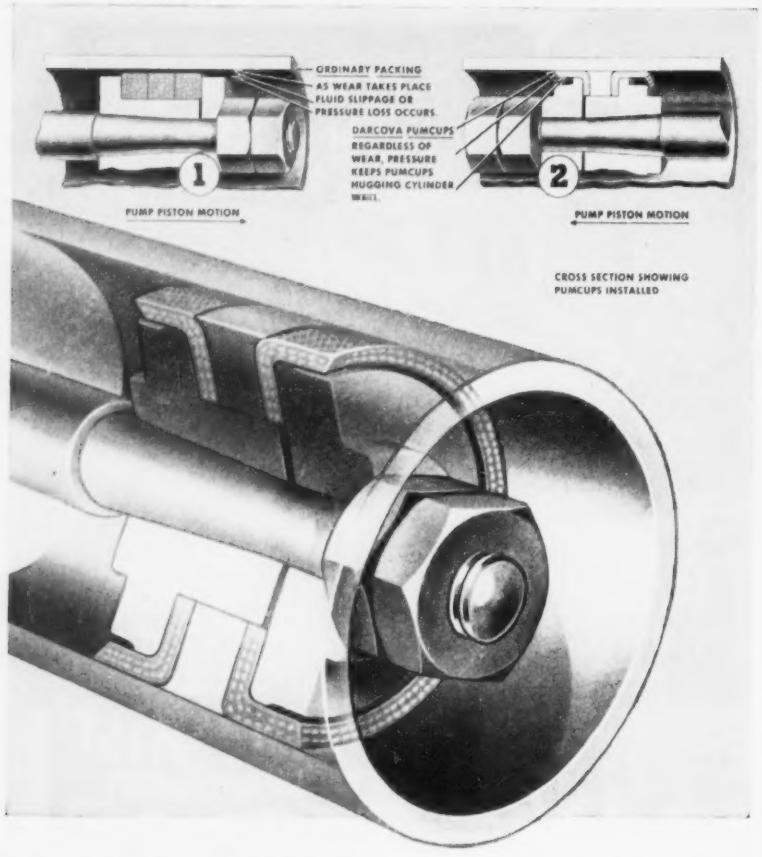
Thus, all of the requisites for controlling application can be embodied in centralized systems. Let us see how this affects operating costs.

New System Costs

In contrast with the three-fold cost of the individual contact or manual method, the centralized system involves just one cost—the initial. There can be no cost for carrying it around, as it is permanently installed.

The manner in which it is used controls the application of the lubricant. Therefore, excessive maintenance costs due to improper lubrication are avoided.

But the outstanding contrast is the fact that the centralized system re-



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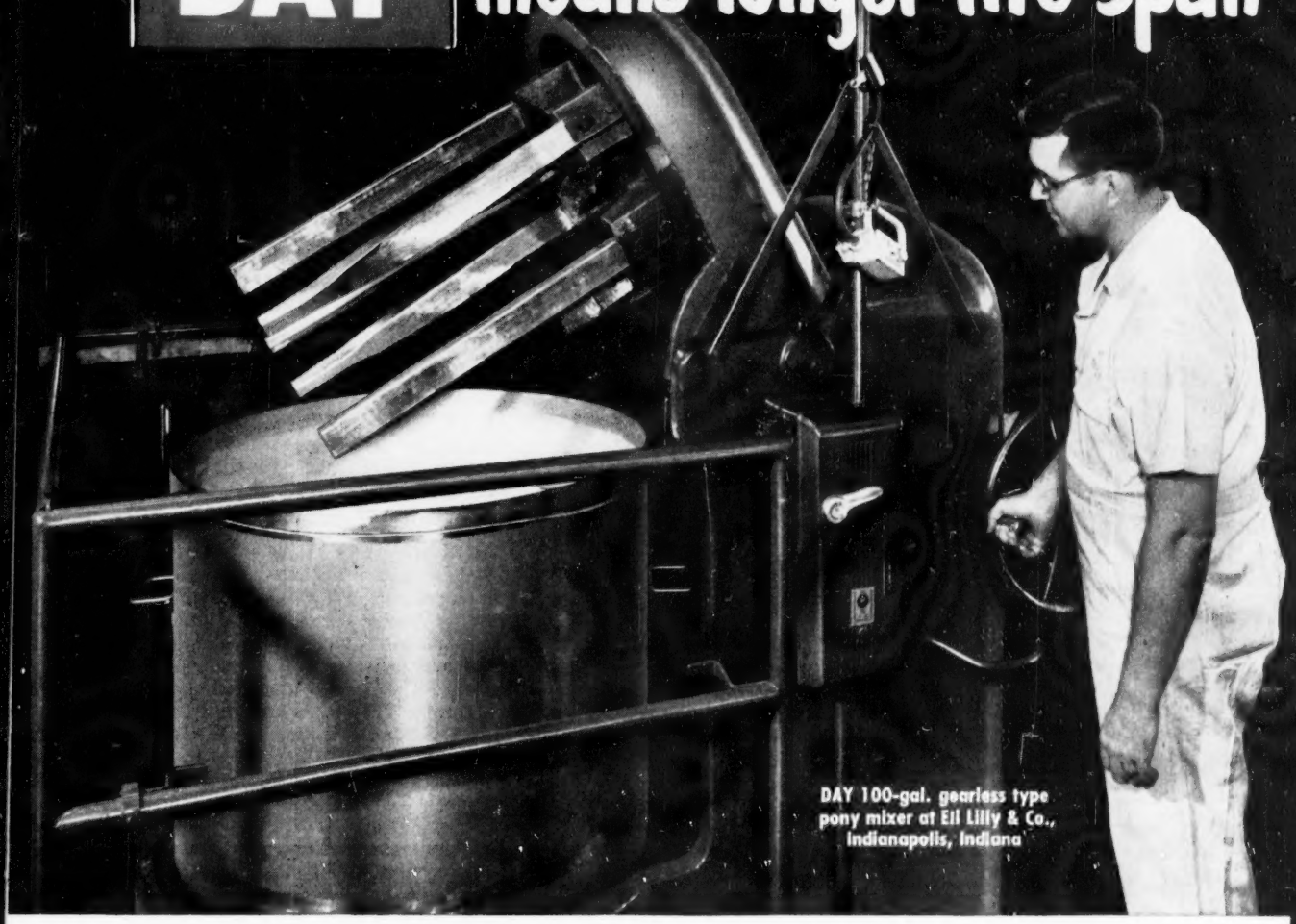

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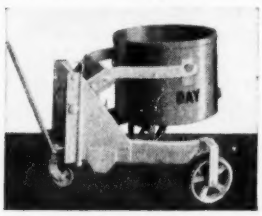

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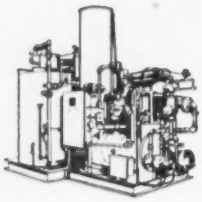

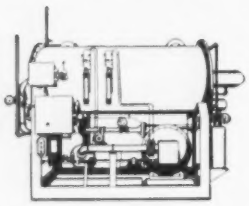

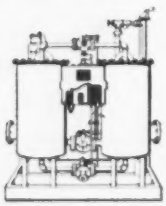

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funds its total cost in lowered operating expense in all major categories, over and over again, as long as it is used. Individual contact methods continue to increase in cost, indefinitely.

Benefits gained from the centralized system may be summarized as follows:

1. Prevents waste of lubricant.
2. Reduces man-hours devoted to lubricant application to a very minimum.
3. Eliminates machine down-time for lubrication.
4. Eliminates machine down-time for repairs due to bearing failure or faulty operation of worn parts resulting from inadequate lubrication.
5. Increases productive rate and efficiency of machinery to a uniform maximum.
6. Improves quality of product.
7. Eliminates product spoilage from dripping of excessive lubricant.
8. Reduces power requirements by eliminating friction—maintains power used consistent with work done.
9. Eliminates personal injuries and corresponding compensation costs attributable to lubricant application.

Surveying Requirements

Supplementing the benefits stated above, it should be mentioned that the fullest advantage to be derived from centralized systems cannot be achieved, from an economic standpoint, by merely selecting and installing a system. This is true because the ultimate purpose is centralized mass lubrication. This calls for blanketing the total requirements of existing machine units, with allowance for future additions, much the same as in planning an installation for power, gas or water. Therefore a detailed survey of machine lubrication requirements is necessary in order to select a system that is sufficiently flexible in application and uniform in design to meet all conditions. Where possible, machines should be grouped in banks or zones of 25 to 50 units, and served by one central time lock-controlled pump.

Maintenance Change-over

It is rarely possible to convert to "centralized" in a manner to derive immediate full benefit. The rate at which working schedules can be disrupted, and consequently, a change-over, usually involves a prolonged period of time.

In one respect, this is an advantage, since the change-over can then be undertaken as part of regular maintenance, and the expense that would otherwise perpetuate the old methods can be diverted to provide the new centralized system.

End *(Resume reading on page 84)*

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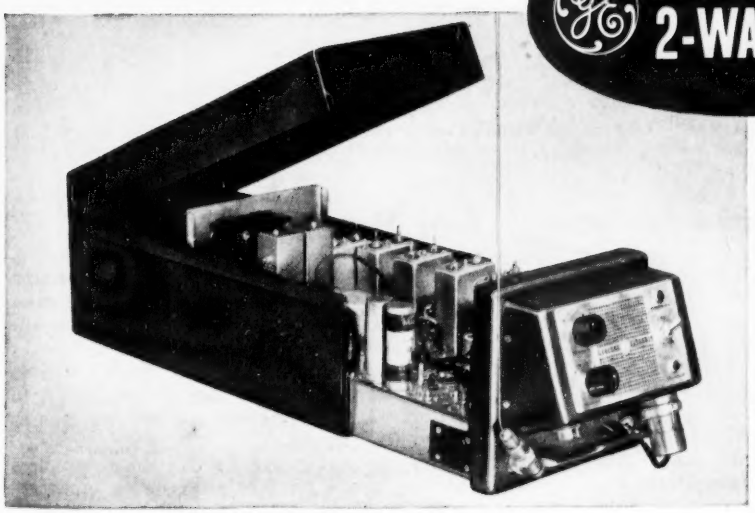

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NEW PACKAGES & PRODUCTS

Spotted at American Meat Institute show were Standard Packaging Corp.'s vacuum packs shown at left: honey loaf, beef loaf and Canadian bacon. At right are colorful packages for shortening and pork products that stress appeal.

Meat Packaging Innovations Featured at AMI Show

Featured among exhibits at the American Meat Institute's recent show were many new types of meats and packages.

Picked up at Standard Packaging Corp.'s booth were three new vacuum-packs: (1) a 2-in-1 package containing 4 oz. each of two different types of cold cuts, packed by Stark, Wetzel & Co., Inc., Indianapolis; (2) molded (square shape) Canadian bacon, packed in 8-oz. units by Pavelka's, Cleveland; and (3) molded, square-shaped dried beef loaf, packed in 4-oz. units by Gus Glaser Meats, Inc., Fort Dodge, Iowa.

Designed by Milprint for Hunter Packing Co., St. Louis, was a waxed cardboard tray for weiners, with colored pictures of franks on the side of the tray and cut-out trading card pictures of St. Louis Cardinal baseball players.

Fractional bacon package calls attention to package convenience and flavor protection. Package eliminates time-wasting check weighing in two out of three units. If total weight is uneven, it can be remedied by opening one unit.

The Marathon booth featured a waxed carton containing four pre-measured, half-cup sticks of shortening, packed by the Rath Packing Co., Waterloo, Iowa, with a window in front of the package insuring product visibility.

Seen at the Sutherland booth were Swift's carton-packed Brown 'N Serve sausages that are pre-cooked to reduce shrinkage. The package featured the "package to platter in 3 minutes" theme.

Among other suggested packages displayed were six slices of bacon and six of link sausages packed on a cardboard tray and cellophane-overwrapped, as well as individually "cello"-wrapped half pound portions of weiners and sauerkraut, both of them in one large package. Cellulose banded meats, combining one large and one small can, were shown.

Pre-packaged fresh meats with packers printed band-label within transparent wrapper and retailers label outside presented something new, while four frozen minute steaks in printed "poly" bag, with a creased cardboard stiffner carrying the packers brand name and serving as a bag closure, also attracted attention at Du Pont's booth.

For Package Data Use Reader Service, p. 159

Fortified Fresh Nonfat Milk

The Borden Company, New York City, announces that its Maricopa Division in Arizona, is introducing a new type vitamin-mineral-fortified fresh skim milk.

One quart of this fortified nonfat milk contains only 440 calories. Rich in milk proteins, it supplies the minimum adult requirement of nine important vitamins and minerals as established by USF&DA. These are: vitamin A, thiamine, riboflavin, niacin, vitamin D, calcium, phosphorus, iron, and iodine. The skim milk's natural content of these substances is stepped up by adding nonfat milk solids and a special concentrate developed by Borden laboratories.

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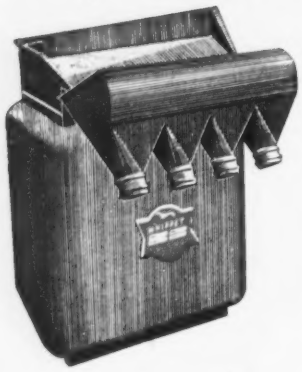

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Yo Ho Ho and a Box of Biscuits

Novel and attractive is the "Holland Treasure Chest" package recently introduced by United States distributors of the Victoria Biscuit Co. of the Netherlands. Constructed of heavy tin, the box is distinguished by its finish, closely resembling that of antique silver. It was designed by John Tan Braak to supplement the company's line of biscuit packages and to attract consumer interest during the holidays.

For Package Data Use Reader Service, p. 159

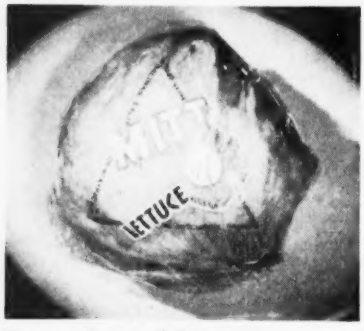
Candy-Filled Dolls

A novelty item, in the form of a candy-filled doll, is now being distributed by Case International Co., Cleveland.

These dolls, imported from Dufour, Italy, are hand-made, hand-painted, measure 6 in. in height, and are brilliantly gowned in colored felt.

Doll pictured above wears a gray felt skirt and a pink blouse, with a green shawl. Her sash is multi-colored silk and her straw hat is trimmed with several colored felt flowers. Face is hand-painted and doll has actual hair. Six different types are available, each gowned in a distinctive costume, representing one of the six Italian provinces.

Dolls are filled with Italian assorted fruit drops. After candy is removed, skirt can be restuffed and used on a what-not shelf or as a toy for children.



Prepackaged Lettuce

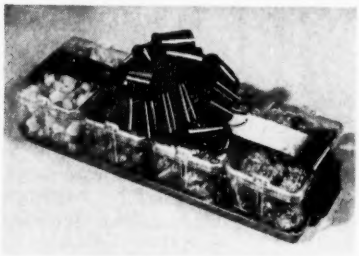
Lettuce is now joining the ranks of the many vegetables which are being prepackaged because of stress made on impulse buying and point-of-purchase appeal.

Hitchcock Packing Co., Salinas, Calif., one of the first to initiate lettuce prepackaging has adopted a color

ful and attractive transparent wrap.

The cellophane wrapper (Milprint, Inc., Milwaukee) is printed in three colors: forest green, sunset red, and white. In center of wrapper the company and product are identified in dark green printing, while trade name "Mitt" is illustrated in sunset red and white by a baseball mitt and ball. All around edge of wrapper runs a lacy pattern of sunset red flowers. When wrapper is applied the pattern covers back of lettuce and predominating red-orange color accentuates crisp, bright green of lettuce head.

For Package Data Use Reader Service, p. 159



Variety Gift Containers

A set of four transparent plastic refrigerator boxes on a plastic tray is being offered by Tri-State Plastic Molding Co., Inc., Henderson, Ky. These are especially suited for use as Christmas packages for food and candy assortments.

The transparent boxes measure 3¼x4¾x2⅛ in.; the tray, 14¼x5⅛x¾. The set is also available with two of the above shown boxes and one 4¾x6¾x2⅛ in. box.

For Package Data Use Reader Service, p. 159

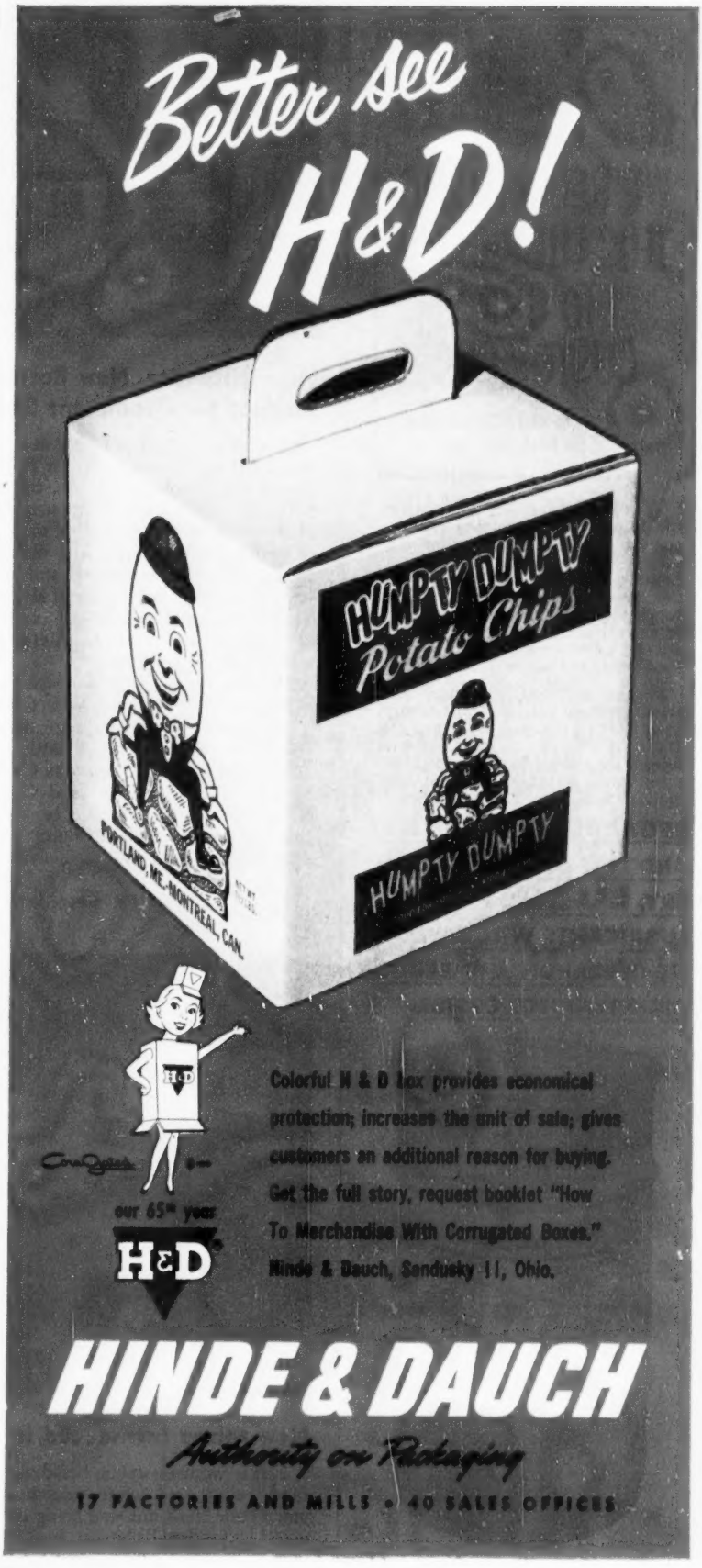
Pie Pan Can for Beef Pot Pie

After considerable research, Trenton Foods, Inc., Kansas City, Mo., has developed a crust-enclosed beef pot pie that is being marketed in a sealed metal container, which requires no refrigeration.

The pie, sufficient for three servings, contains chunks of lean beef, carrots, peas, potatoes, and a small amount of gravy, covered with a flaky crust.

Pies are sealed in a specially designed drawn metal container. Preparation of product is simple. Consumer removes top of can with can opener, slips pie in its own pan in oven, and serves it from the pan, which may be used over and over as a kitchen utensil.

Container's 6-color lithograph design resembles flaky gold of baked pie crust and pictures a cutaway section revealing a bright picture of a portion of the pie.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REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

New Dispenser, New Bottle, New Product for Condiment Sauces

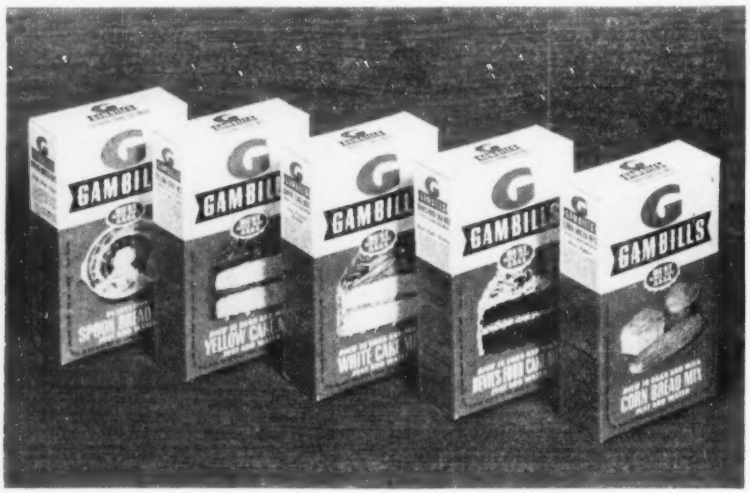
A new-type dispenser with a no-drip shaker top has been adopted by R. T. French Co., Rochester, N. Y., for its 5- and 10-oz. bottles of Worcestershire sauce. A plastic fitment slips on top of bottle which permits only desired amount of sauce to shake out and prevents sauce from leaking down side of bottle. For bulk use, fitment can be removed and later replaced. Bottle is sealed with plastic closure.

La Choy Food Products, division of Beatrice Foods Co., Archbold, Ohio, is now using a ½-oz. miniature of its well known La Choy sauce bottle for its meatless Chinese dinner, its Chow Mein noodles, chop suey and Chow Mein packages. It will also be available for use by carry-out stores handling Chinese foods and for individual table service at hotels and restaurants.

An A-1 Worcestershire sauce has been added to G. F. Heublin & Bro. Inc., Hartford, Conn., present line of A-1 sauce and A-1 mustard. New sauce, available in 2- and 5-oz. sizes, is made from an old English formula and aged in vats before bottling. Attractive yellow label and decorated bag-type covering give the product good display features. These bottles also use the new no-drip fitment and the plastic closures.

Bottles, fitments, and closures on all above items are furnished by Owens-Illinois Glass Co., Toledo. On the Heublin item, labels are supplied by Kellogg & Buckley, Hartford, Conn., and paper bag covering by Union Bag & Paper Co., New York City.

For Package Data Use Reader Service, p. 159



New Mixes Introduced in Colorful Cartons

Five new mixes—spoon bread, devils food, yellow and white cake mixes, and a corn bread mix—are being introduced by Lindsey-Robinson, Inc., Roanoke, Va., in specially designed packages.

Cartons (Sutherland Paper Co., Kalamazoo, Mich.) of Lustercote

board provide a sparkling white background for the eye-appealing 5-color design. In each case main panel features an illustration of some of the finished product. The back carries directions and the side panels are used for additional recipes and coupons.

For Package Data Use Reader Service, p. 159

Asparagus in Glass

Canned asparagus spears, packed in glass, have been added to the Cannon brand of foods, manufactured by H. P. Cannon & Son, Inc., Bridgeville, Del.

To obtain maximum visibility and present to consumer an appetizing looking item the 13¼ oz. of "Martha Washington" spears are packed, tips upright, in a glass jar (Owens-Illinois Glass Co., Toledo), with a vacuum sealed closure (White Cap Co., Chicago). The narrow band label (Stecher-Traung Lithograph Corp., Rochester, N. Y.) is distinctive and informative yet does not detract from the visibility of product.

For Package Data Use Reader Service, p. 159

Package & Product Shorts

"Meal In a Hurry" Additions

Sliced beef liver and sliced calf liver are being marketed by Armour and Company in an attractive 8-oz. package. Each package contains four separated slices, providing three to four servings.

Fish In a Stick

Birds Eye Fish Sticks, 4-in. long sticks of filleted fish, have been introduced in 10-oz. packages. Dipped in batter, then deep-fried, sticks are designed for use as a ready-cooked main dish or as appetizers.

Bag o' Lard

Peschke's Packing Co., Iona, Mich., is processing 2-lb. bags of lard. Supplied by Milprint, Inc., transparent bag is printed with label.

For coding labels... it counts a lot!

The Tickometer, a very accurate counting machine, can be, optionally, equipped to mark, imprint or "rubber stamp," while counting. Food and drug firms, for example, use it to code product labels. Others use it to date-stamp and endorse checks and other items.

Thousands of firms, in many different lines of business, use the Tickometer to count sales slips, coupons, tags, invoices, tickets—practically anything made of paper. Wherever they use it, they find that it not only saves the time and work required by hand-counting—but makes results available eight to ten times faster. And it's so accurate, thousands of banks use it to count currency.

Rented, rather than sold, the Tickometer requires no capital investment. Pitney-Bowes service is available from 201 locations, coast to coast. Ask the nearest PB office for a demonstration or send coupon for free illustrated booklet and folder, "Twelve Case Studies of Savings." These case studies show the remarkable results achieved in the counting and or marking of paper forms by many Tickometer users.

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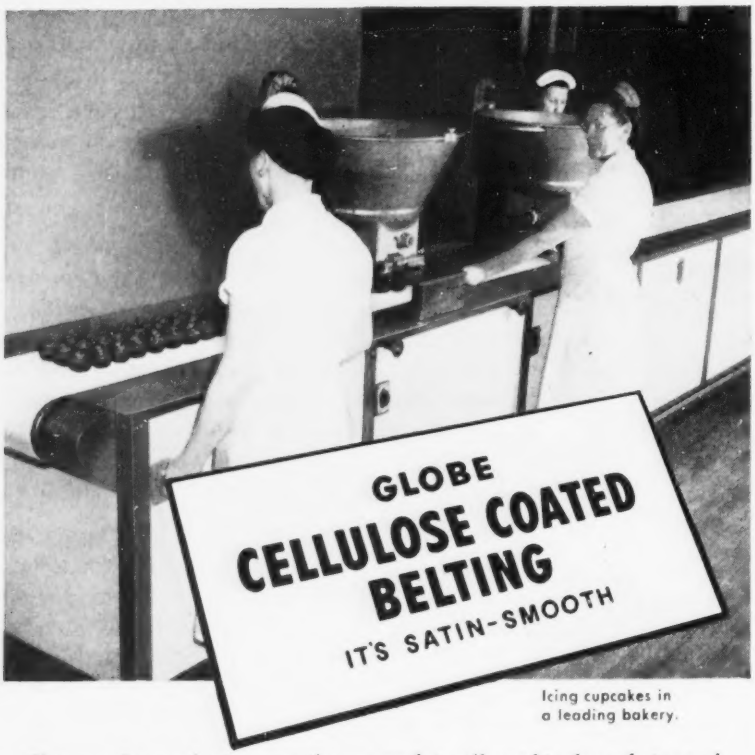
fats and oils can't penetrate it! tacky foods won't cling to it!



Icing cupcakes in a leading bakery.

Convey the product . . . not the excess fats, oils and tacky substances! That's sound advice for any bakery or candy plant demanding product purity . . . freedom from contaminating flavors and odors from previous batches.

. . . and that's advice that can be carried out easily, *with consistent success*, if you convey your foods with Globe Cellulose Coated, Solid Woven Cotton Belting.

Its satin-smooth finish cannot be penetrated by fats or oils from excessively greasy products, making it ideally suited to doughnut-making machines. All grease remains on the surface, to be quickly and thoroughly washed away with soap and water. *The only completely sanitary way!*

Nor will tacky particles cling to Globe Cellulose coating, as they do to the rough, uneven surfaces of other belts. What better reason for such widespread use on cookie cutting machines and in candy plants?

Waterproof and heat resistant, possessing all the well known strength and wearing qualities of its solid woven cotton carcass, Globe Cellulose Coated Belting is the only satisfactory solution to conveying problems in many types of food industries, including packing plants.

Available in clear amber or opaque white, coated on the carrying side only or pulley side, too, it is manufactured in widths from 1" to 60" and in all standard plies.

Free samples and literature, plus the name of your local distributor, will be furnished promptly by writing Dept. E.

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KNOWN FOR QUALITY THE WORLD OVER

Balky Bulks

—*Continued from page 98*

Car weight limit has a very interesting effect on results obtained for some materials. For example, if the car could not be loaded full and level, it would contain a smaller total volume of material. Therefore, less material would flow out by gravity and less would remain in the car—depending, of course, on the angle of slide and slide conditions.

However, even a car only partially loaded with a higher specific weight material may have a larger total weight to discharge manually or mechanically than if loaded completely to its top with a lighter product.

For removal of remaining material in a hopper car by manual means, unloading personnel have had to bang the sides of the car or actually climb inside and dig and chop the material loose. The latter method is dangerous and involves considerable time.

A mechanical method, such as a car shaker, involves only one man at the controls—away from all danger—and effects a considerable saving in man-hours needed to completely discharge a load.

In operation, the shaker unit — which sets on the eaves of the car— causes the bottom sheets of the carrier to vibrate through a small amplitude. This vibration joggles the material down along the sheets to the hopper openings.

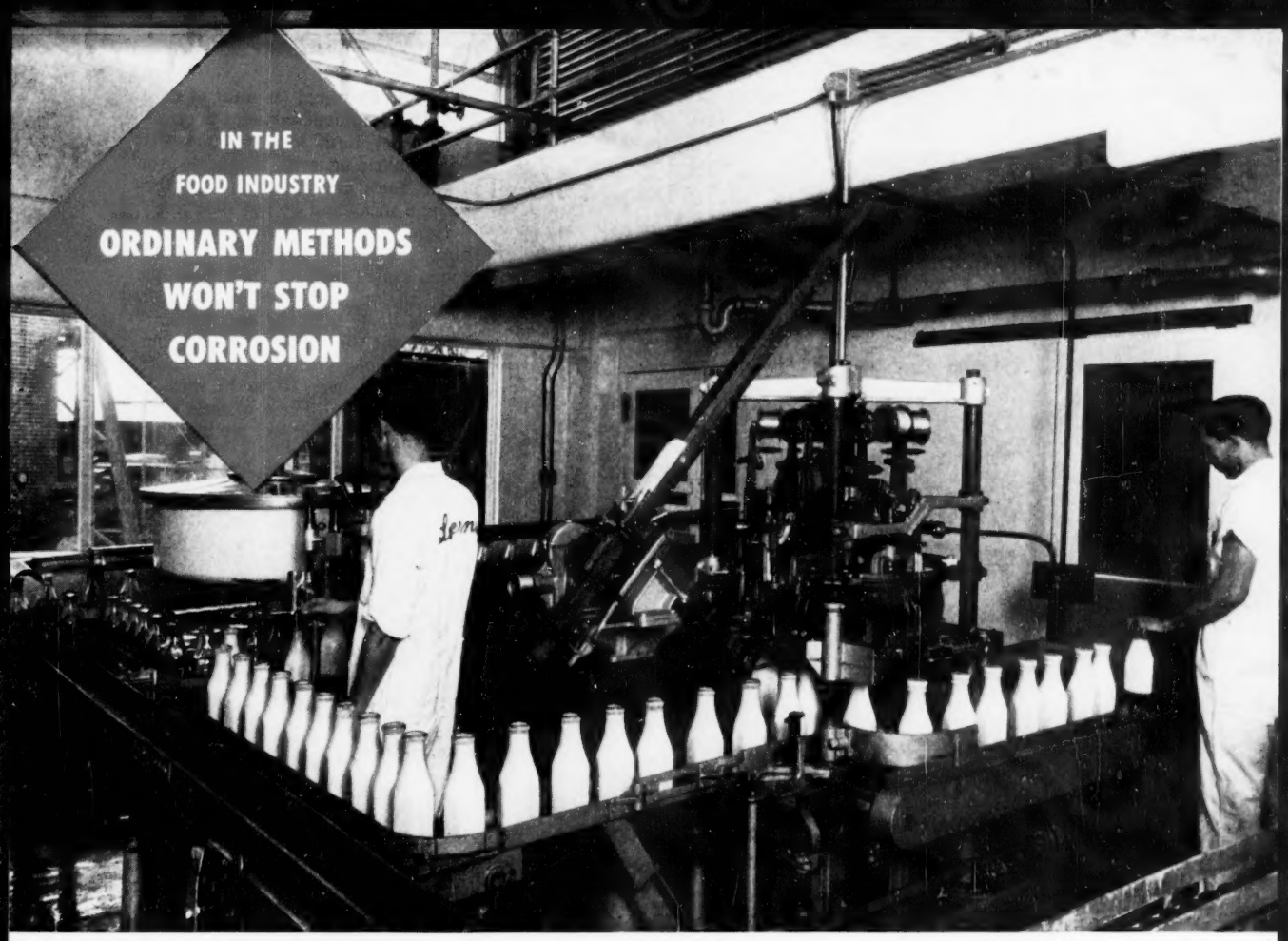
Principle of the unit is simple. It produces a relative movement between car slope sheet and load material. Too low a speed of operation will not effect discharge, and too high a speed will damage the hopper car. Thus, a proper shaker speed and time of operation permits maximum unloading with minimum operating and maintenance costs—all without damage to car or track-supporting structure.

Case History

To show what can be accomplished with a car shaker, let us briefly review some test results with three beet sugar companies on the West Coast.

In handling sugar beets, the shaker had to overcome the tendency of the product to bridge over the hopper openings and pile up behind the chains that are used to open and close the doors. Also, the sugar beets refuse to slide freely down the doors on the ends of the car because these have less of a slope due to the car wheels. The beets also stick along the center ridge, which runs the length of the car.

If the sugar beets have been me-



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Ordinary methods for controlling corrosion usually produce the ordinary results—rapid paint failure, costly replacements, product contamination, excess down-time, and hampered production. Halfway measures and the use of one or two general purpose coatings simply cannot provide adequate protection against corrosion's ceaseless attack.

Amercoat gives you a proven method of corrosion control, assuring you proper protection through these PLUS features:

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2. The ONE best recommendation for the particular problem. AMERCOAT is a complete line of coatings, each formulated to solve or control specific corrosion problems.

3. On-the-job assistance to your applicators and supervisors by a trained engineer. The AMERCOAT method ensures proper attention to surface preparation and application techniques for maximum protection.

4. Complete stocks of fresh materials always near you at one of AMERCOAT's five regional warehouses or more than 20 franchised distributor warehouses throughout the United States.

5. Service based on experience. The AMERCOAT method of corrosion control is the result of nearly 20 years' experience in solving or controlling corrosion problems in every major industry throughout the United States.

Write today for the name and address of the AMERCOAT representative in your area. At no obligation, he will gladly help you analyze your corrosion problems and evaluate your present control measures. If it is determined that you have a problem within our scope of experience, he will outline a complete program of AMERCOAT's PLUS protection for your plant or equipment.

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chanically harvested (as most of them are), the shipment contains a certain amount of trash and toppings that make unloading even tougher. And if the beets are wet from rain they become sticky and do not slide freely.

Here, the car shaker keeps the sugar beets from bridging over the doors, shakes product loose from the door chains, and also causes beets to slide freely from the end doors.

Without the shaker, the beet companies involved expend the efforts of four men over 10 to 15 min. to unload one car. These workers must get inside the carrier and pry the beets loose as they bridge.

Tests with the shaker showed that a car could be unloaded by two or three men in 2-3 min. And the men do not have to enter the car—a notable safety element.

On the above basis, the cost of unloading sugar beets can be reduced by 2 men for each unloading station, and the unloading capacity can be increased about five times over the present when the plant is geared up.

Coal Handling

Another case history reviews the situation at a large manufacturing plant that is utilizing one of the earliest models of this machine.

Flow of coal in this plant is as follows: Incoming cars are spotted over a hopper that has approximately 10 tons capacity. Coal from this receiving hopper then feeds into a crusher, and the crushed coal then goes via bucket elevator and belt conveyor to bunkers for in-plant use.

Before the car shaker was installed, three men were permanently assigned to empty the hopper cars, and during winter two additional men were needed. Thus, three to five men were kept busy continuously to keep a sufficient amount of coal bunkered.

Time required to empty a 50-ton car averaged about 1¼ hr.—varying according to conditions. Using average time, then, in summer it required 3¾ man-hours and in winter 6¼ to empty one hopper car.

In addition, unloading by this method often necessitated "coal mining" operations inside the car itself. Needless to say the accident rate on this job was high.

Since the shaker was installed only one man has been permanently assigned to emptying all incoming coal hopper cars. During severe winter weather—when there is freezing of the material—a second man is needed to handle thawing operations.

Actual limitation of the car shaker at this location is dictated by capacity of conveying facilities. Receiving hopper size, crushing capacity, bucket

elevator and conveyor limits do not allow an entire hopper car to be unloaded at one time.

If it were not for discharge facility limitations, a 50-ton car could be emptied in a matter of a few minutes when the material is not frozen.

In this "case history" plant, the accident rate for the entire coal handling process was greatly reduced and actual car unloading hazards eliminated due to the remote location of the control platform for the operator, well away from danger. The average age of car shaker operators is now around 60 yr., and the safety record they have built up is outstanding.

In an ideal installation—one with suitable materials handling and switching facilities—a shaker unit will unload up to 15 cars of coal every hour. At one site, for example, a series of cars are discharged, without changing track positions, by handling the car shaker on a monorail hoist and moving it from car to car. In this case, each car contains different analyses and is spotted over the correct receiving hopper. Thus, the products can be blended, if desired.

Due to the variables that can enter into any given situation, the information contained in this article should be considered in the light of the specific operation. Naturally, the men responsible for unloading operations are best qualified to apply this information to their own situation.

End (Resume reading on page 99)

Fewer Repeats

—*Continued from page 127*

tion is no problem, generally being limited to a thorough washing.

Standardized Internals

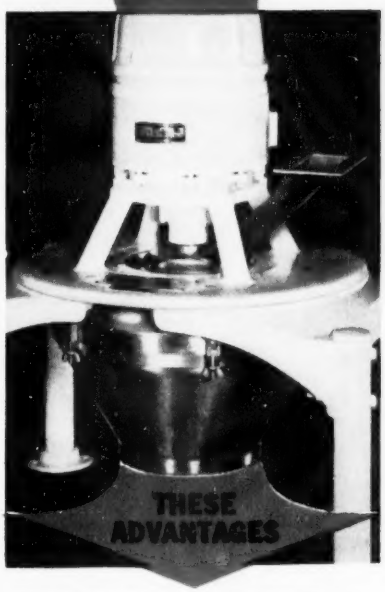
In most areas, coating life is such that repainting need only be done annually. In the offices, yearly cleaning is the rule, with repainting every two or three years.

With such standardization of plant area re-painting intervals, work of the painting crew can be scheduled as much as six months in advance. This makes it possible for an eight-man crew to handle all the painting work in the three Hood plants that are located in greater Boston, as well as in ten of the company's 37 branches located throughout New England.

Men are assigned to an area for two days—one day for each coat of paint to be applied—although the 4-hr. drying time of the epoxies makes it possible to paint some of the smaller areas in one day.

End (Resume reading on page 129)

"ENTOLETER" HIGH SPEED MIXER



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Whenever you select a power unit, don't put a straight-jacket on your ideas . . . consider ALL of the possibilities of modern power drives.

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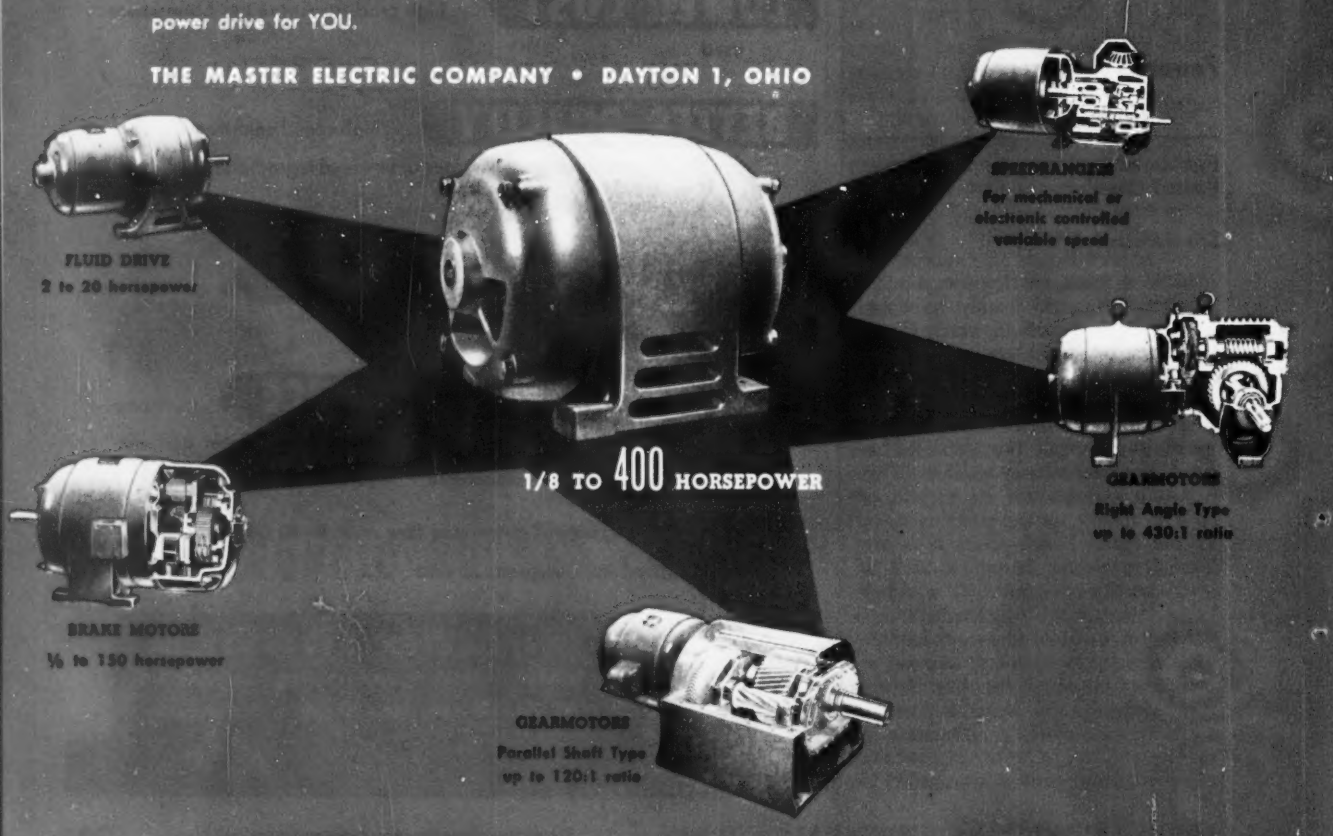
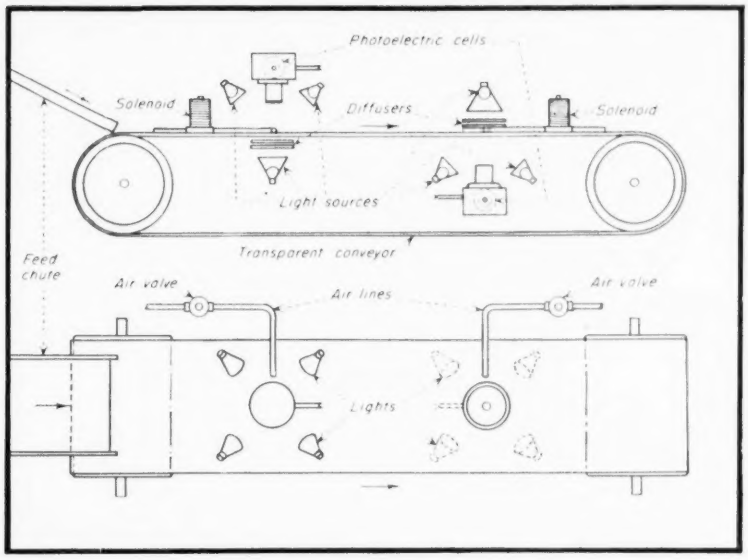


ADVANCES IN TECHNOLOGY



Transparent Belt Is Key To Improved Color Sorter That Scans Products Both From Above and Below

A photoelectric sorting apparatus having means to inspect and sort conveyed objects such as nuts and beans as they may be seen from both sides of the conveyor surface is covered by a recently patented invention.

Employed is a transparent, horizontally disposed conveyor formed of a suitable material such as cellulose acetate sheeting. Pulley faces and surfaces of other parts coming in contact with the sheet must be covered with felt or soft rubber to prevent scratching.

Suitably positioned along conveyor are 2 photoelectric inspection stations —one above and one below the belt (see illustration above). Each is comprised of a photoelectric cell contained in a light-tight box having an aperture and lens system for determining the active field of inspection. Surrounding the box are reflective light sources. On opposite side of conveyor belt is a background light source and ground glass diffusers which eliminate undesired conveyor reflections.

Pipelines containing air under pressure are connected through solenoid controlled valves to nozzles so positioned in the inspection areas as to blow objects out of the line of normal travel when a valve is actuated by one of the photo cells.

Feed chute is equipped with guides that form a spaced single line of objects passing the two inspection areas.

Digest from U. S. Patent 2,645,343, issued July 14, 1953, on an application filed April 27, 1949, to C. T. Nemir, Washington, D. C., assigned to The Kelling Nut Co., Chicago.

BAKING

Moisture Content of Cake Flour Governs Mix Keeping Quality

Use of dehydrated flour and powdered shortening are effective means of extending keeping quality of prepared cake mixes stored under adverse conditions.

A series of cake mixes was compounded with undehydrated flour (11.7% moisture) and the same flour dried to 8.0, 2.8, and 2.1%, respectively. Also used were plastic and powdered shortenings.

Samples were stored in hermetically sealed containers at 100 F. Portions were test baked at monthly intervals, and free fatty acid determinations were made bimonthly.

Mixes containing undehydrated flour deteriorated in baking quality in 4-6 months; those with 8% moisture flour in 7-8 months; those with 2.8 and 2.1% flours remained satisfactory during the entire year of the study.

Mixes compounded with powdered shortenings were more stable than those in which the plastic product was used. Free fatty acid development paralleled deterioration in baking quality—natural flour at a constant, fairly high rate; 8% moisture flour at a slower rate, and the 2.8 and 2.1% flours extremely slowly or, in some cases, not at all.

Digest from "Effect of Moisture Content on the Stability of a Yellow Cake Mix Compounded With Plastic and Powdered Shortening," by C. S. McWilliams and T. Soloski, *Cereal Chemistry*, 367-77, Sept. 1953.

Amino Acids Inhibit Bacteria That Cause Food Poisoning

About 90 percent of food poisoning outbreaks from cream-custard pastries are due to micrococci rather than to *Salmonella* species. *Micrococcus pyogenes* var. *aureus* 210 has been used in experiments testing inhibitory action of a number of amino acids.

With inoculums of 300-1000 per 100 ml. of cream custard, thioglycollic acid, DL-serine, L-cysteine hydrochloride, and glycine showed inhibitory effects. DL-serine was chosen for

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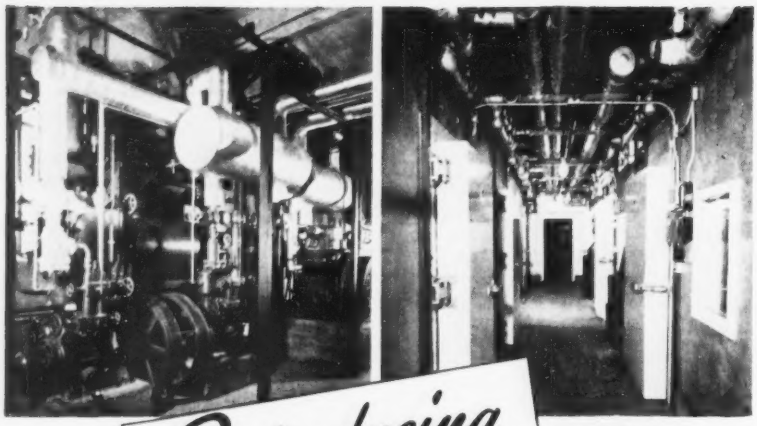

Introducing

VILTER, V.M.C., Ph.D.

University: Oregon State College, School of Agriculture, Department of Food Technology.

Course Objectives: To determine the types of cooling and freezing equipment to be used for various food products.

Requirements: Cooling eleven 11′ x 17′ x 10′ rooms. Selective load requirements. Temperatures from −30° F. to +45° F., controllable within ½°. Rigid humidity requirements. Product load to vary from no load to freezing and product reduction to −30° F., by merely setting room thermostats. Automatic control of temperature and humidity.

Equipment: One Vilter VMC 4-cylinder booster compressor, two Vilter vertical twin cylinder compressors. Evaporators range from bare pipe coils, to ceiling type blower units, to floor mounted blower units, to fin coils, to plate type coils, according to food to be cooled. Evaporators controlled by various means, including float valves, using accumulators, some flooded with thermal expansion valves, and some with thermostatic expansion valves.

Achievements: All objectives attained. University definitely satisfied. Equipment uses minimum space.

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further study since it had little effect on the organoleptic qualities of custard. It reduced plate count on incubated, inoculated custards from 930 million to 15.6 million when used at a concentration of 0.2 percent, and to 1.3 million at 0.4 percent.

DL-serine is least inhibitory in fillings containing milk and eggs, more inhibitory if eggs alone are present, and most inhibitory in custards containing only milk. Both D- and L-serine are effective against *M. pyogenes*, as well as against heat-resistant flora indigenous to cream custards, but do not inhibit enterococci or *Salmonellae*.

Digest from "Inhibiting Effects of Amino Acids and Related Compounds Upon the Growth of Enterotoxigenic Micrococci in Cream Pastry" by A. G. Castellani, *Journal of Applied Microbiology*, 195-99, July 1953.

FRUITS & VEGETABLES

Late Blight Disease of Potatoes Not Spread by Roll Drying

Sponge rubber roll dryers have been found as satisfactory as forced hot air for drying washed Maine potatoes. The vegetables keep equally as well, and moisture remaining on the sponge-dried ones is insufficient to cause paper bags to break in transit. When completely dried their appearance is excellent.

These are findings of a study conducted by the Maine Agr. Expt. Sta. using Katahdin variety potatoes and a regular spray-type vegetable washer. Potatoes were then dried by two methods, packed in 50-lb. paper bags, and 4 carloads containing equal quantities of heat- and sponge-dried products were shipped to Mass. At destination 5-16 days later, heat-dried potatoes averaged 4.8% external grade defects, sponge-dried ones 4.0%.

Additional shipments of sponge dried potatoes, made by trucks to N. Y. and Mass., showed 2.8% defects at time of packaging, 2.4% at destination.

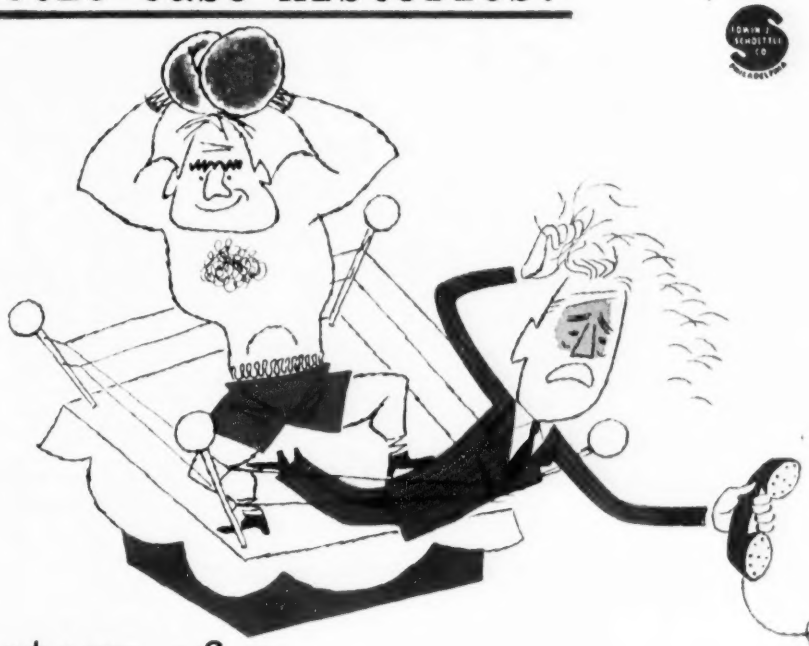
Advantages of the sponge-type dryer are: Lower initial, installation, and operating costs, ⅓ the floor space, unit can be easily moved from one warehouse to another.

Digest from "Sponge Rubber Roll Drying of Washed Maine Potatoes," by A. L. Perry, *Bul. 517, Maine Agr. Expt. Sta.*, Orono, Maine, June, 1953.

Yeasts VS Beetles In Figs

Dried fruit beetles (*Carpophilus hemipterus* (Linn.)) are one of the most common insects infesting figs. Their depredations ruin fruit not only by their own presence, but also be-

Schoettle Case Histories:



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Purchasing Agent on the Ropes

CASE HISTORY #107 Sales had been zooming and one of our important baking company customers* suddenly discovered it had only one day's supply of special U-cards for sliced cake . . . Purchasing Agent was on the ropes . . . didn't realize inventory was so low . . . A plea for help . . . no U-cards, no sliced cake! (And, maybe no Purchasing Agent!) Schoettle came to the rescue, delivered U-cards on 2-days' notice. Took PA off the ropes!

CASE HISTORY #95 Dairy* said they must get into the market quick with an ice cream sandwich container, to meet competition. Schoettle is large producer of boxes for entire Ice Cream Industry, so we were able to ship boxes from stock on very next day . . . and Ice Cream Sandwiches were in stores two days later . . . Purchasing Agent, hanging on the ropes and counting the minutes, breathed sigh of relief . . . and thanks!

Schoettle never throws in the sponge when a Purchasing Agent is hanging on the ropes . . . We go all out to KO his carton problems the minute the (phone) bell rings . . . Championship service like this has won Schoettle "box-ing" fans throughout industry . . . And if YOU'd prize a good man in YOUR corner, your next bout with boxes, just make Schoettle your "second" . . . FIRST!

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cause they spread microorganisms that induce fermentation and spoilage.

Whether yeast infections associated with beetle infestation are due to the beetles, or whether beetles, which are known to be mycophagous, are attracted to figs by yeasts already present in the fruit, has not been completely established.

Collection of beetles from Adriatic and Calimyrna figs in orchards at Fresno and Planada, Calif., and plating of their intestinal contents, yielded 75 cultures of yeasts. Most of the isolates were species of *Hanseniaspora* and *Candida*, rather than the *Saccharomyces* and *Candida* species previously found on fresh figs by Mrak. Yeasts were tolerant of temperatures up to 46 C, and 50-55 Brix sugar solutions.

Dried fruit beetles digest yeasts rapidly. When allowed to feed on cultures of *Candida krusei* and *Hanseniaspora valbyensis*, 150,000 yeasts were obtained from the average insect immediately after feeding. The number dropped to 300 after 2 hr., and to 75-100 in 4 hr.

Attractivity tests showed that insects were attracted by *C. krusei*, *H. valbyensis*, fig tissue, and *Torulopsis carpophila* (new species of yeast, isolated from the intestinal tract of the dried fruit beetle) in that order. A yeast mixture was preferred to one of yeast alone, but fermented fig tissue, or sourness due to *Acetobacter* species were not attractants.

Digest from "easts Associated With Dried Fruit Beetles in Figs" by M. W. Miller and E. M. Mrak, *Journal of Applied Microbiology*, 174-78, July 1953.

CANNING

Continuous Sterilizer

Apparatus for continuously sterilizing sealed cans of food, in contrast with the older batch treatment in autoclaves, is the subject of a recent patent.

Filled and closed cans of food are transferred to a conveyor belt at one end of a long narrow trough. Belt slopes downward and travels through a body of liquid at 250-300 F. A mineral oil with flash point of at least 250 F. is suitable. At opposite end of trough, conveyor slopes upward and moves cans out of sterilizing bath.

Then cans are carried under a series of sprays disposed above tanks to receive the draining material. First is a hot water spray designed to remove and recover oil adhering to cans. In succession come a detergent spray, a cold water spray, and an air spray. Thereafter cans pass to labeling machine. Rheostats adjust speeds of filling and closing machine, belt con-

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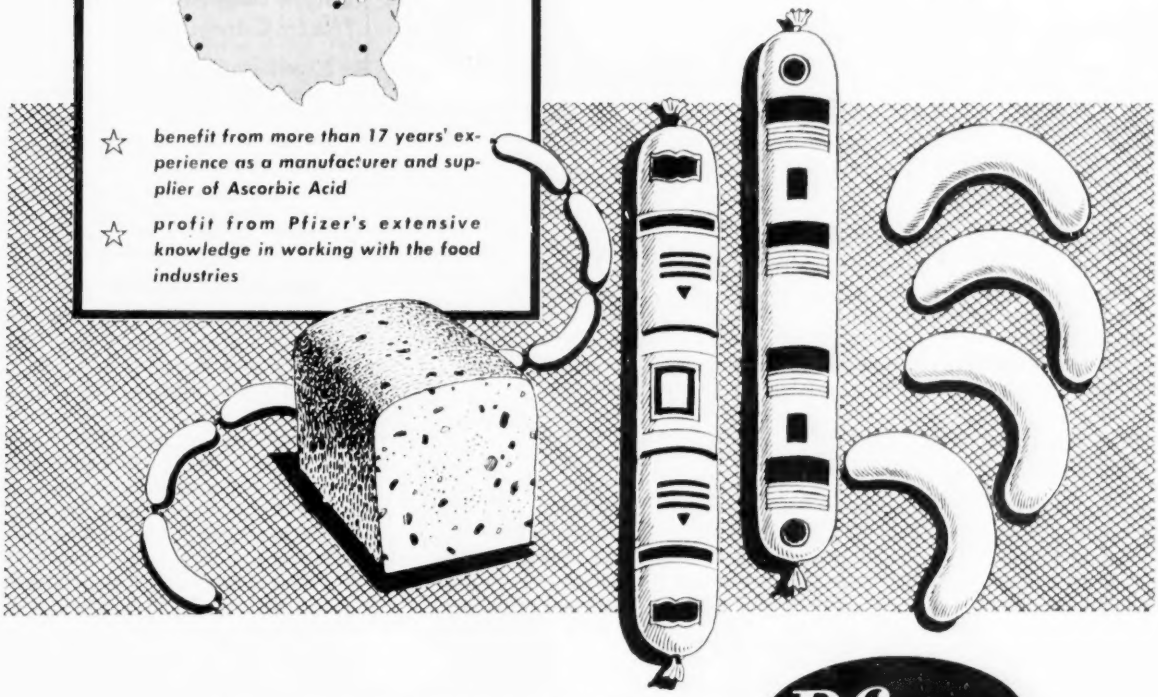

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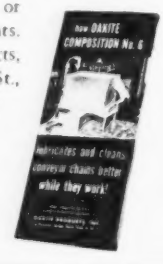

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veyor, and labeling machine. Temperature of bath is under thermostatic control.

Digest from U. S. Patent 2,641,176, issued June 9, 1953, on an application dated June 21, 1945, to E. N. Higgins, Emsworth, and V. P. Evans, McKees Rocks, Pa., assigned to H. J. Heinz Co., Pittsburgh.

DAIRY

Sterile Milk Process

Canned whole fresh milk that does not have an objectionable cooked taste or odor, and will keep almost indefinitely in any climate is the object of a recently patented process.

Milk of good quality is pasteurized at 163 F., homogenized at 2,800 psi., and filled into previously sterilized cans. Jets of dry steam are directed against tops of filled cans as they move to seamer, thus assuring a vacuum of 9-10½ in. in closed cans.

Sealed cans are retorted at 238-240 F. for 14 min. with continuous agitation, then cooled in 10 min. to 100 F., and removed from retort to ice water tank for further cooling to 50 F. in 15 min.

Digest from U. S. Patent 2,642,363, issued June 16, 1953, on an application dated Jan. 23, 1952, to John C. Moeri, New Orleans, assigned to Farm Fresh Milk Corp., Miami, Fla.

Calgon Does Not Benefit Frozen Cottage Cheese

Experimental evidence indicates that addition of sodium hexametaphosphate has no beneficial effects on flavor or texture of frozen cottage cheese.

Work was undertaken in the hope of discovering an agent that could be added to cottage cheese during the manufacturing process that would not be objectionable and which would prevent the formation of a grainy, friable texture when defrosted. Sodium hexametaphosphate (Calgon) was selected because it has produced desirable characteristics in other cheeses.

In the current investigation cheeses were made with 0.12 and 0.36 percent Calgon. They were frozen immediately at minus 10 F. and stored at 0 F. Untreated controls were used for comparison.

Penetrometer tests before storage showed that cheese containing Calgon was softer than the controls; and that after storage the differential was still greater. Organoleptic tests showed that texture of all cheeses before storage was acceptable, but that of frozen curd was less desirable than that of fresh.

After storage, controls always ranked

first; 0.12 percent Calgon second; and 0.36 percent last. Thawed curd had a grainy texture, and cheese containing Calgon was softer than controls. Flavor tests followed the pattern of texture tests, acceptable before storage, but not after. Texture and flavor decreased progressively as length of storage increased.

Digest from "The Effect of Sodium Hexametaphosphate on Flavor and Texture of Frozen Cottage Cheese," by Eva Medved, Inez Prudent, and Louis H. Burgwald, *Food Technology*, 316-18, Aug., 1953.

Improved Cheese Package

Reliance on a thin film of oil and capillary attraction to exclude air from packaged cheese is the basis of a recent patent.

Inventor observed that, in spite of the impervious character of a plastic wrapper, air enters the package through folds of the material. This occurs at open ends of the wrapper, for example, where material is folded in a reverse bend that is not sharp enough to avoid formation of an air passage.

According to the patent this condition is counteracted by introducing oil between fold-layers. Capillarity will draw the oil into crevices and creases resulting from the fold and seal potential air passages. Saran, a thermoplastic material of the vinyl group, and paraffin oil, are preferred materials. Oil is applied along two edges of the wrapper which, when folded in the usual manner, will form the desired seal.

Digest from U. S. Patent 2,635,049, issued Apr. 14, 1953, on an application dated June 27, 1950, to E. E. Eldredge, Plymouth, Wis., assigned to The Borden Co., New York.

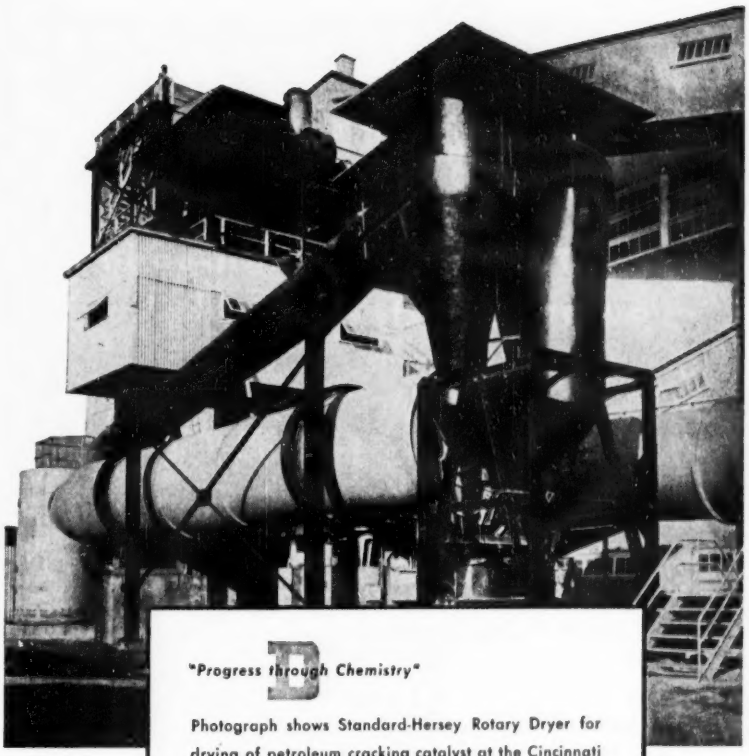
MEAT & POULTRY

Turkeys Carry Psittacosis

A strain of psittacosis (parrot fever) virus has been isolated from turkeys for the first time, although existence of the disease had been suspected since 1941 when the virus was isolated in chickens.

This was demonstrated during a psittacosis outbreak last year among employees of poultry-dressing plants in Texas. There were 63 cases, with 4 deaths. In backtracking to discover source of the epidemic, investigators isolated the virus from tissues of turkeys taken from farms supplying dressing plants. Their studies showed the virus has great virulence and infectivity.

In its acute state, the disease is characterized by severe pneumonia. In chronic cases it may be much less



"Progress through Chemistry"

Photograph shows Standard-Hersey Rotary Dryer for drying of petroleum cracking catalyst at the Cincinnati Plant of The Davison Chemical Corporation. Patented Standard-Hersey intermediate-feed system makes the unit in reality a combination flash and rotary dryer with most desirable characteristics of each.

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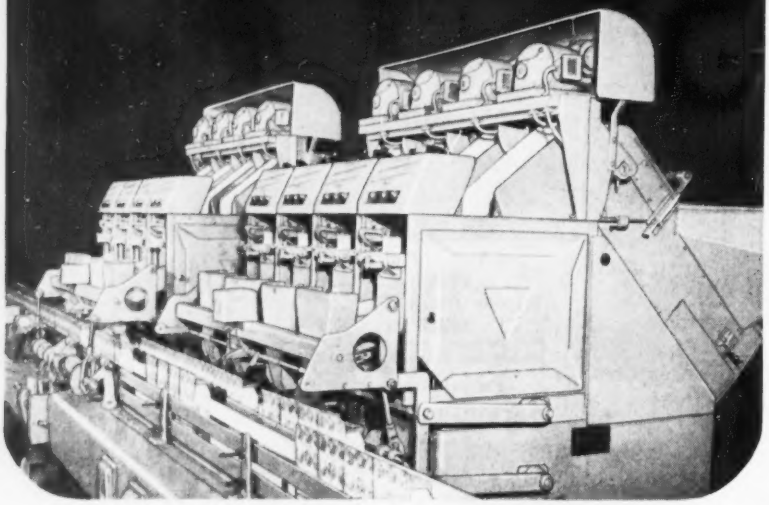

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severe, with symptoms like influenza or a bad cold. Some patients may suffer from it for long periods without knowing it. Aureomycin effectively controls the disease when a proper diagnosis has been made. Diagnosis is sometimes difficult, however, and the infection remains a dangerous one. Recovery is often slow.

Digest from "Characteristics of a Psittacosis Viral Agent Isolated From a Turkey," by K. F. Meyer and B. Eddie, *Proceedings of the Soc. of Experimental Biology & Medicine*, 99-101, 1953.

SANITATION

Low Vapor Pressure Fumigants Best For Semi-Open Places

In locations such as elevator boots, low vapor pressure fumigants of high toxicity have an important application.

This was determined by experiments using two proprietary fumigants having high and moderate vapor pressures and hexachloropropene—vapor pressure 0.3 mm. Hg at 25 C.

Fumigants were added to boots of elevators carrying middlings, tailings, or low-grade flour. Treatments were assessed by bioassay with adult confused flour beetles. Two wire gauze envelopes, each containing 25 insects and 11g. cereal stock were inserted in each boot. Insects were exposed initially for 1 day to determine immediate effectiveness of products. Residual effectiveness was assessed by subsequent 2-day exposures.

Ethylene dichloride and ethylene dibromide each gave high initial kills. But after 5-days former was ineffective, latter fell off rapidly.

Hexachloropropene, on the other hand, gave very low initial kill, but after 3-days mortality reached practically 100% and remained at this point for 26 days. It dropped to 65% in 49 days, but returned to 100% when exposure periods were increased from 2 to 6 days.

Digest from "Initial and Residual Effectiveness of Spot Fumigants in Elevator Boots," by F. L. Watters and B. N. Smallman, *Cereal Chemistry*, 343-48, July 1953.

Separates, Destroys Insects

Apparatus has recently been patented for continuous removal of insects from grain. Once separated, they are destroyed by crushing with heavy metal balls traveling in channels.

Apparatus comprises a framework suspended by flexible members. Within the frame are sets of superimposed screens and channels. Circular or gyratory motion is imparted

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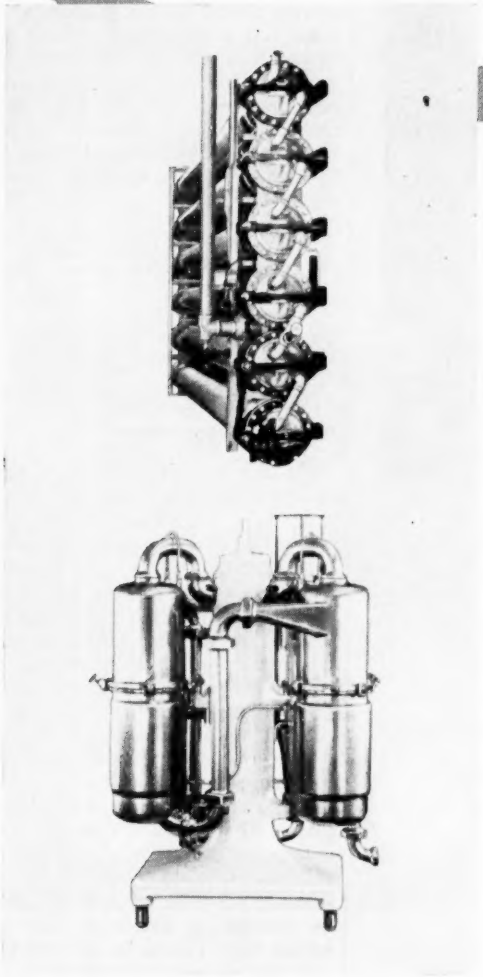

Whether you use multiple-stage heat exchangers for fast cooling of brews—or flash pasteurizer-evaporators for the production of better butter; whether you cook, pump, cool or can foods or food products of any kind, there is a story worth thinking about in the equipment pictured at the left.

It's a simple story—"There's a difference in stainless tubing, and Carpenter makes the best of it". It's a difference that's measurable in adherence to rigid standards of analysis, dimension, finish, tolerance, concentricity, ductility.

What this difference means to you is simple, too. It means longer life for equipment, easier cleaning, lower maintenance costs, and, in the event repairs are needed, lower working and fabrication costs.

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Food Engineering Reports

LATEST TECHNICAL NEWS

In Keeping Up With Field . . . . page 193

to the apparatus from below. A feed chute leads to the screen.

In operation, grain is fed through the chute where a current of air draws off dust and chaff. Falling onto the upper end of a vibrating screen, grain travels downward toward the discharge, insects fall through the mesh into channels containing freely moving metal balls. Latter are in constant motion caused by the gyratory apparatus, and as they move forward and backward in the channels crush the insects. This screening operation is performed twice, after which the clean grain is discharged. Insects are further crushed by passing continuously through a series of channels containing moving balls.

Digest from U. S. Patent 2,637,624, issued May 5, 1953, on an application dated Jan. 16, 1948, to Herbert R. Klink, Roanoke, Va.

STORAGE

Reflective Insulation In Fruit Warehouses

Comparative tests of apple storages insulated with (1). reflective insulation, (2). sheet cork (4-in.), and (3). 12 or 24 in. of shavings, showed an overall transmittance for reflective insulation slightly lower than for cork, but not as low as for shavings. Cost of reflective material offers considerable reduction in investment.

Details of the tests include description of the structures, location of accordion-pleat aluminum foil, and other forms of insulation, calculation of average daily values for both temperature and heat flow, and approximation of investment costs.

Greatest deficiency of reflective insulation is its susceptibility to mechanical injury. It must be protected by dunnage or sheathing. For best results edges should be stripped with lath after stapling to studding in order to avoid bulging and formation of air passages.

Depending on various local factors, cost of reflective insulation suitably protected is estimated at about 25c. per sq. ft. This compares with 40-50c. for 12-in. of shavings, and $0.6-1.0 for an equivalent amount of board insulation. No cost is given for cork.

Digest from "Reflective Insulation—Its Performance in Fruit Storage Warehouses," by G. F. Sainsbury, *Refrigerating Engineering*, 183-87, April, 1953.

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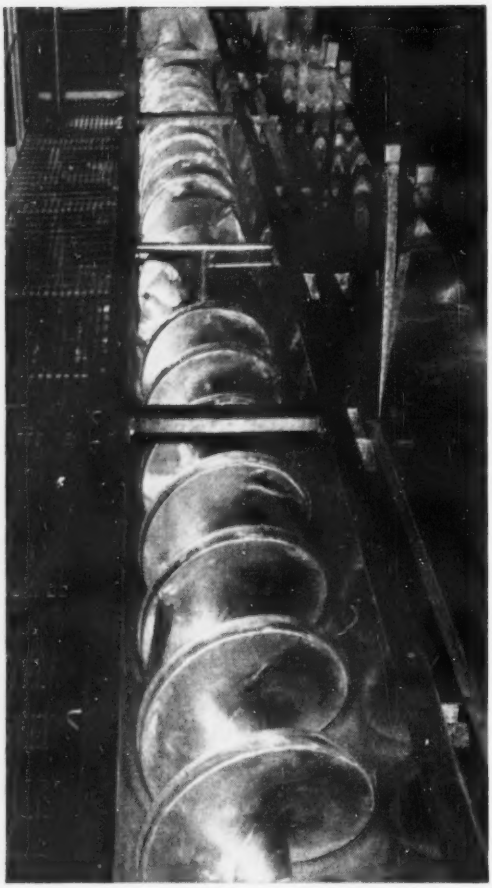

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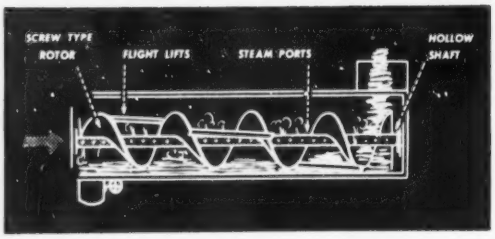

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Soluble Coffee

—*Continued from page 78*

the counter-current series flow, the spent coffee within it is steamed and washed in order to get out the last traces of water-soluble solids. This thin liquid is concentrated, either in open steam jacketed kettles or in vacuum evaporators, then blended with the rest of the extract.

Spent grounds are removed from percolators and dumped into drums or trucks. At present the bulk of this material is used to fuel boilers, is dumped into rivers, or carted away and burned in the open. That is where the interesting problem lies—what to do with the grounds. They represent, by weight, approximately 150 lb. of wet byproduct from 100 lb. of roasted ground coffee that yield perhaps 25-35 lb. of soluble powder. In other words, on a dry-solids basis, more than twice as much byproduct as pure-soluble coffee is produced.

Drying

Following clarification, the concentrated extract is dried. For this operation, several types of units are employed. Spray, vacuum drum, vacuum belt, and infra-red dryers are examples.

One type of spray dryer used in the soluble coffee field is the Swenson. In it, filtered air goes through a heater into the drying chamber or cone. Extract is transferred, via booster and high pressure pumps, to the top of the cone and sent through pressure spray nozzles into the drying chamber. There is a cyclone collector and a bag filter in addition to a primary product collection system. Exhaust gases are conveyed to the atmosphere by a fan. This dryer might be classified as a combination of cyclonic air flow with concurrent and countercurrent spray.

The Bowen spray dryer, another popular vertical design, utilizes a mixture of air and products of combustion in a furnace for drying. Feed is distributed by means of disk atomizers, the primarily product outlet (dried powder) being at the bottom of the cone. A cyclone collector is used for the removal of fines from exhaust gases.

The Niro spray dryer has the heated air entering the side of the cone. This drying air travels upward through a distributor, while the extract is fed down into the drying chamber by means of a centrifugal atomizer. Powder is collected at the bottom of the cone along with the product of two auxiliary cyclone collectors.

Two other types of spray dryers that should be mentioned are the Zizinia,

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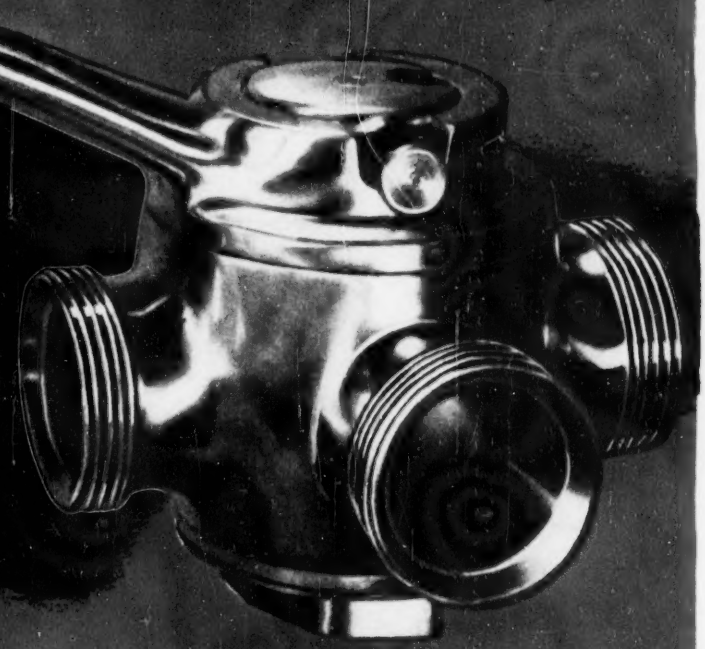

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• Here are the component parts of the new Tri-Clover Auto-Lift Plug Valve. As shown, this new valve is available in standard Acme thread construction, as well as with flanged ends to be used with the new fast-action TRI-CLAMP sanitary fittings—for "take-down" lines or for "permanent" cleaned-in-place lines.

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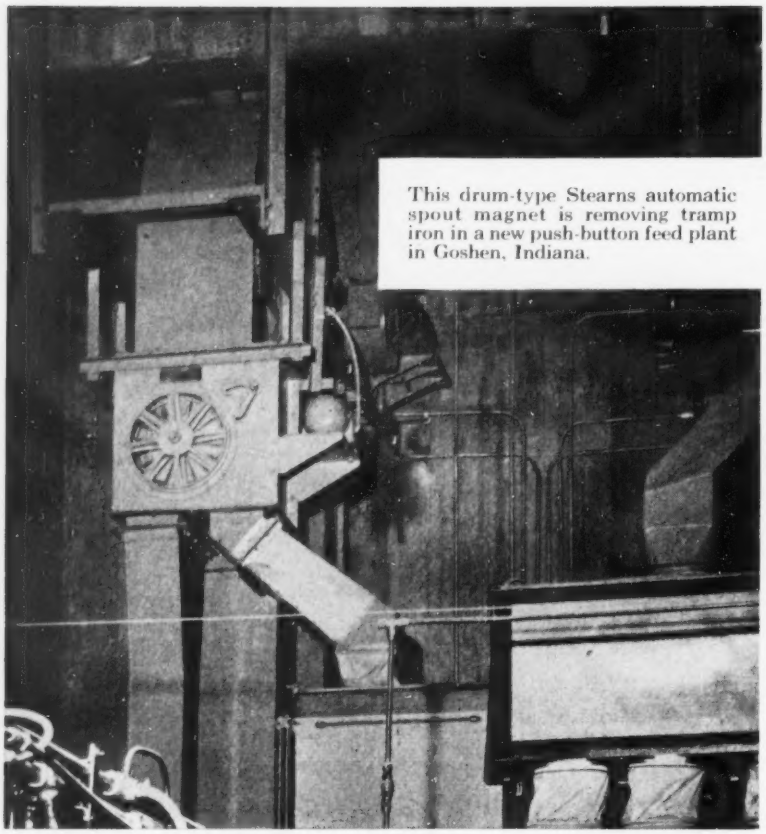

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Material in process can be fed into the separator at any angle, over a stainless steel cylinder surrounding a stationary electro or permanent magnet. As this material passes through the magnetic field, the contaminating tramp iron is held to the face of the cylinder and carried to a point beyond the magnet's pulling force and dropped into a discharge chute! The purified product falls by natural trajectory into a separate chute and continues through its production process.

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which is a vertical downward concurrent type, and the Western Precipitation unit, which can be classified as vertical upward concurrent.

Drum Dryers

Operating cycle of a vacuum drum dryer may cover 6-8 hr., after which the vacuum is broken and the powder removed. Normal dryer capacity would be about 200-300 lb. per hr. This product is very soluble in water and is granular in appearance.

In a modified drum dryer of Danish manufacture, a thin layer of extract is applied to revolving stainless steel drums, where it is exposed to a large volume of clean air. A substantial amount of heat is removed and the temperature drops. Patented features of this equipment are the air ducts. Steam or hot water is used to maintain the correct temperature for dehydration. It is claimed that this process does not coagulate proteins nor destroy flavor components present in the liquid.

Drying occurs in 3-6 sec. Since only surface molecules are in contact with the air stream, oxidation is at a minimum. Actual cost of dehydration is a few cents per gallon of liquid, depending upon the temperature, fuel, electricity, and labor costs. Capacity of equipment is 160-260 lb. per hr. per meter of drum surface, depending upon the temperature and concentration of the liquid.

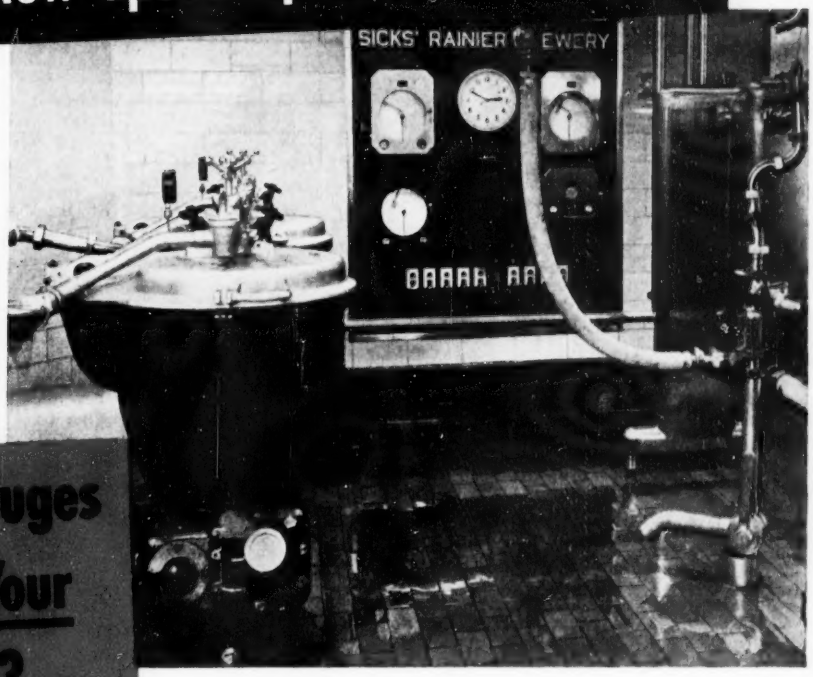
Other Dryers

The vacuum belt dryer has a stainless steel belt moving through a vacuum chamber. Coffee extract is sprayed on the belt before it enters the chamber. Drying occurs at low temperatures. At the end of the cycle a scraper removes the dried product from the belt, preferably into an atmosphere of inert gas or vacuum. Usual processes of grinding, sieving, and packaging follow. The dried particles have excellent rehydration qualities because of their hollow spherical nature.

In the infra-red freeze dryer, water is removed from a frozen mass in a vacuum chamber by sublimation. The extract is frozen, then put in the vacuum chamber where it is exposed to wires glowing in a special range of temperature. Water (in ice form) is thus caused to sublime directly from the frozen mass without first going through a liquid phase. Radiation is applied through the transparent bottom of special trays.

Present trend in soluble coffee manufacture is toward decreased bulk

Centrifuges Now Speed Up Beer Brewing...



...Can Centrifuges Replace Your Filters?

Two different kinds of De Laval Centrifugal Clarifiers are being used with great success in the Brewing Industry. The first is the De Laval Hermetic® Wort Clarifier, which by means of centrifugal force removes trub from the wort. This removal of solids from liquid formerly was entrusted to diatomaceous earth filters. The centrifugal method is not only much faster but is a great deal more economical, for centrifugal action is entirely mechanical and does not require constant replacement of any essential element.

The second De Laval Centrifugal aiding the brewmaster today is the Beer Clarifier, used to clarify the almost-finished beer. The De Laval Beer Clarifier replaces another filter—and as in the case of wort clarification, effects great savings in time and operating cost.

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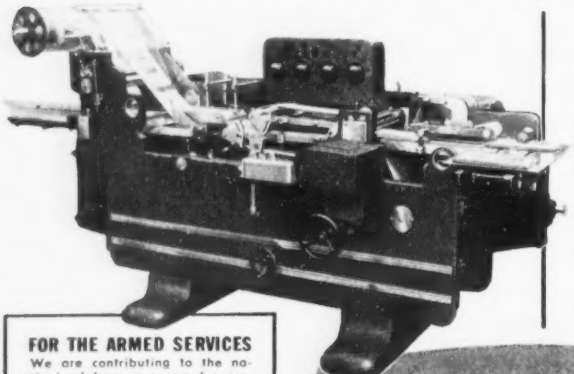

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density. For, when the spherical volume is large, the particles will dissolve more readily. Also, they will occupy more space—the 2-oz. net weight completely filling an 8-oz. liquid jar.

There are a number of factors in spray drying related to such characteristics as bulk density. First, regardless of how the feed liquor is distributed, there must be a high degree of uniformity in atomization in order to achieve desired bulk density.

Solids concentration of the extract is also important, since bulk density increases with increase in feed concentration. This is also true of changes in feed temperature, because better atomization results from reduced viscosity that occurs as the temperature of the liquor is increased.

Higher inlet temperatures tend to produce larger spheres—decreased bulk density. Also, generally speaking, the lower the rate of drying, the smaller the bulk density. Equipment design is the governing factor here.

Solubility of spray dried coffees varies considerably. However, the greater the surface area per unit weight, the greater the solubility. Thus, for particles of equal wall thickness but of varying diameters, the solubility would be a function of the specific volume of the particle.

Packaging

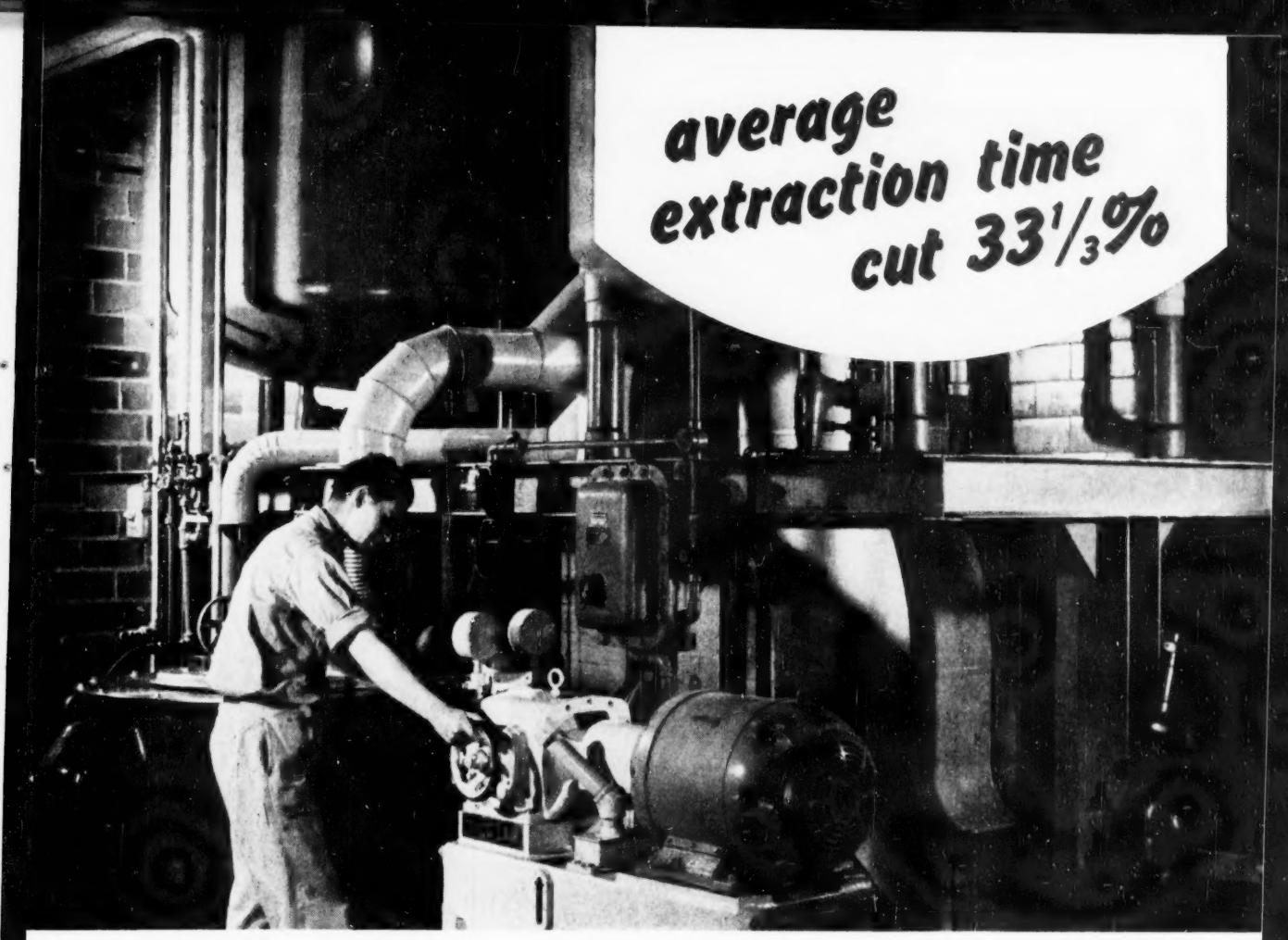
The dried product may be subjected to a grinding or comminuting process. It is then sieved to a uniform particle size and packaged. Fiber drums are used to hold the powder prior to packing in glass jars or cans. If a powder is to be shipping in bulk, it is wise to use a polyethylene bag as a liner.

Standard home-size retail package is 2-oz. net weight, in either a glass jar or cylindrical can. Jars are cylindrical (through shoulder and neck) and have a volume of 7¾ liquid ounces, although there is a growing trend to a larger—8 oz.—size.

Filling operation is standard, a vacuum filling or auger feed machine being utilized. After jars have been filled, closed, and labeled (usually a wrap-around type of label) they are packed into cases of 24 jars each.

Numerous controls are necessary for the production of a consistently high quality soluble coffee. Good direction is needed, assisted by highly skilled analysts. Certainly, the extremely sensitive, expert *cup tester* is a necessity. It is with his labors that the entire process begins—choice of the proper beans. The cupping table, spittoon, kettle, cups, sample roaster, and grinder are his revered tools.

The roasted, ground bean then appeals to the chemist's curious eye. He



Once more the ANY-SPEED Oilgear Drive betters machine performance "painlessly"

Many times in our experience the performance of an already highly efficient machine has been bettered without redesign, solely by changing the drive. One case out of many *varied* cases, is the Tolhurst Centrifugal pictured above, located in a great pharmaceutical house. This centrifugal was originally equipped with a two-speed electric motor drive. However the chemicals it is called upon to handle have widely varying crystal packing characteristics. Some of these crystals packed so densely at the speed available, extraction was inhibited, extraction time far out of balance and crystal removal difficult.

A change was made to an *"ANY-SPEED"* Oilgear Fluid Power Drive. Now the operator is able to shade the speed of the centrifuge experimentally—*and easily discover* the *best* speed for each batch of crystals.

As a result, extracting that used to take from 6 to 9 hours was cut to 4 to 6 hours. The extremely slow speed also available made unloading a great deal easier. This user now has several other Oilgear drives including one on a laboratory centrifuge.

There is very often a direct efficiency coefficient between machine operating speed and the type of work being handled. And we can cite many widely varying instances where equally dramatic and profitable gains resulted at once from a simple change to *"ANY-SPEED"* Oilgear Fluid Power Drives. If you want some interesting factual data on Oilgear's steplessly variable speed drives, their outstanding responsiveness to control impulses, their smooth acceleration and deceleration, talk to an Oilgear Engineering Representative. His mature and sound engineering recommendations may profit you greatly. THE OILGEAR COMPANY, 1580 W. Pierce St., Milwaukee 4, Wisconsin.

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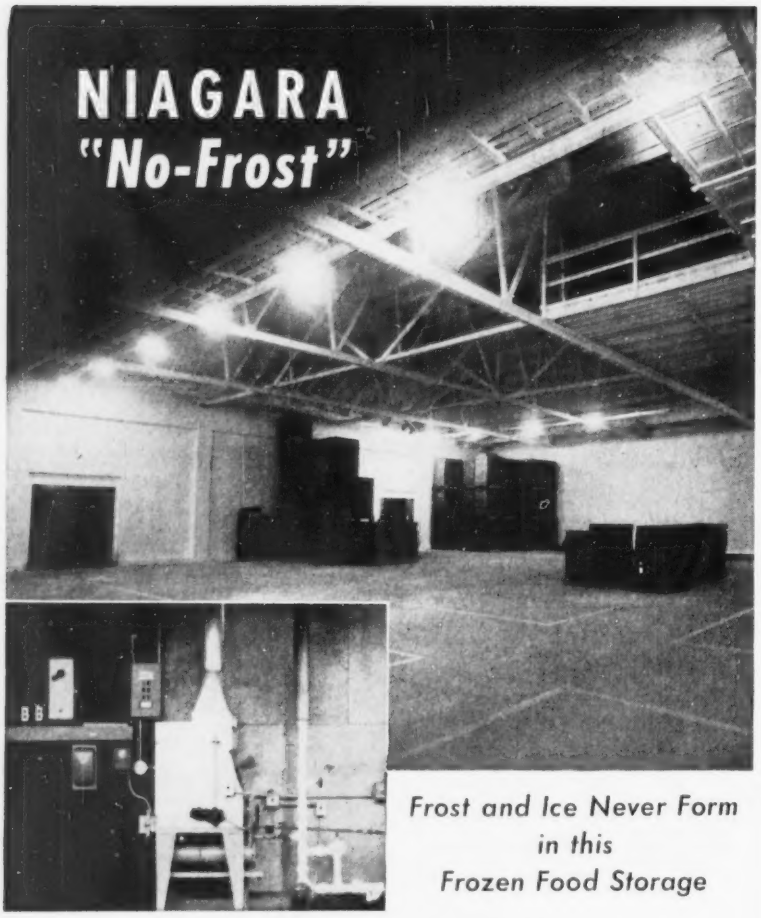

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The Niagara "No-Frost" Method gives you always the full capacity you paid for in your refrigeration, NEVER, not even partially, interrupted for defrosting. You can handle large "live" loads easily. The controls are simple and always give you accurately the temperature and humidity you want. Temperatures never rise to interrupt the "pull-down". You are free of troubles; your rooms stay clean and sweet with easier maintenance and less labor. You save power; your compressors run at higher suction pressures. For every refrigerated room for temperatures below 32° F. this method gives you better product quality at lower operating costs. Many of the finest installations in the industry, both large and small, prove the benefits of the Niagara No-Frost Method.

Write for the No-Frost story and data on its application to your problem. Ask for Bulletin No. 105.

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OVER 15 YEARS OF SUCCESSFUL EXPERIENCE PROVES THE VALUE OF NIAGARA NO-FROST

sets about to find out a number of things about this kernel—such as moisture, acidity, pH, and soluble solids. Whether it is oven or toluene distillation, titration or meter, soxhlet or pilot plant extraction system, the chemist gets the desired facts. He can then say that a given bean of a certain degree of roast and specific particle size has, per unit weight, so much water, a pH of so many units, or such and such an acidity and, of key importance, will afford so much yield.

After the extract has been prepared, it is checked for solids content (and perhaps pH and/or acidity) and cupped. After clarification, the laboratory centrifuge is utilized to determine the efficiency of reduction of sedimentation. This, of course, is also checked practically by adding hot water to the extract and allowing it to cool, decanting the contents carefully, and noting the residual solids in the cup.

Many of these same factors are checked again just prior to drying, since concentration or dilution may also have affected the nature of the extract. During extraction, as well as drying, all characteristics of the process are noted carefully. The dried product is classified for particle size, tried for fill in the commercial package, tested for its solubility, as well as its pH, acidity, sediment, and moisture.

—*End*—

G-Raying Wrappers

—*Continued from page 56*

can be thus sterilized. For example, it might be desirable to irradiate cotton fibers, leather, and other materials in bulk to prevent mildew damage or to prepare them for use in special situations where sterile materials are required.

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End (*Resume reading on page 57*)

Here's a new idea that can preserve almost indefinitely the delicate flavors that go into dessert mixes, cake mixes and similar food products. Volatile flavor oils can now be protected in a stable, solid form by means of a process developed and patented by Atlas.

The process consists of trapping the oil in solid sorbitol. You mix or emulsify the essential oil in molten sorbitol, allow the mixture to solidify, then work it into pellets, flakes, rods or tablets. The low temperatures involved avoid damage to delicate oils. The resulting solid is completely non-volatile, except when powdered extremely fine. It can be incorporated into mixes and packaged in paper containers with less loss of flavor. And it dissolves readily in water.

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...they're engineered to satisfy driver, maintenance man, management

Here are the most advanced 6000-7000 lb. fork trucks on the market today—Clark's gas or electric UTILITRUCS. Built to handle jobs that break the backs of less rugged trucks, these UTILITRUCS have proved their superiority in foundries, steel mills, stevedoring* and heavy warehousing. They represent an ideal balance of essential engineering features. They get more work done at less cost, for these reasons:

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All controls at the driver's fingertips, like an automobile; compact and more maneuverable; shockless steering; increased braking efficiency; 140 sq. inches additional visibility; 25 inches of free-lift; DYNATORK or HYDRATORK DRIVE available on gas model.

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Complete accessibility for maintenance. On gas model: one-piece "zipper" hood folds back to expose engine; one-piece floorboard lifts up to expose master cylinder and transmission; swing-out battery. All service points easy to reach.

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Welded, integral-unit box frame eliminates distortion; higher inch-pound rating; axle-to-frame mounting absorbs shocks and strains; new design wheel and backing plate seals out dirt and abrasives. Oil bath air cleaner and oil filter standard on gas model. Totally-enclosed drive motor, sealed-for-life bearings on electric model.

We invite you to compare the UTILITRUCS to any 6000-7000 lb. truck on the market! Without obligation, you can discuss them with your nearby Clark dealer, listed in the Yellow Pages of your phone book. Or write us for free descriptive literature.

*Special stevedoring model available

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CLARK EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 14, Michigan

Safety Record

Continued from page 85

sure that float valves are installed. Cover interlocks and barrier guards are standard equipment with us, as well as standard guards on conveyors, belts, and chain drives.

The employee's work station is also considered on the basis of our experience, motion studies, and accident analyses. If protective devices of any kind can be used, we feel it is our job to have these engineered into the original setup.

Our program also includes first aid training as sponsored by the Red Cross. All of our supervisors and many employees have completed both the standard and advanced courses. In addition, well over 50% of our employees have completed the standard course. The classes are held during working hours in a special room set aside for this purpose.

This program of first aid training makes each employee more aware of safety in general, and thus implements our prevention campaign.

Our first aid room is completely equipped and staffed, and if treatment is given an employee it is recorded for passage to the personnel department. This information is completely analyzed as a guide to correcting departmental conditions causing accidents. Bi-monthly summaries of this data are sent to each supervisor as well as to the production manager.

"Goal-Line Protection"

We believe that each accident is a loss for our team, and so every effort is made to prevent a repetition. Our organization has been carefully built up over a number of years, and we think that we can truly say we have a safe place in which to work.

We believe that receipt of an award is an opportunity for furthering general employee consciousness of safety. On the occasion of our last award, the plaque was accepted by our president, at a special meeting attended by company executives, supervisory personnel, union stewards, and the safety committee.

We had hoped to have a mass meeting of all employees, but our work schedule would not permit. We did, however, have a special display constructed in the company cafeteria, and employees were treated to ice cream and cake during their lunch hour on that day. In other words, we came as close to a party as our production allowed.

End *(Resume reading on page 86)*

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Questions & Answers

THIS MONTH'S PROBLEM

Question — We are continually plagued with missing floor drain-cover plates. No matter how often we instruct personnel on the importance of always keeping them in place, they still seem to be misplaced and, of course, present a serious safety hazard. Can you suggest what we might do?

Answer to September Problem

The Question Was—Converting a batch-type, vacuum-pan cooking process for preserves to a continuous one has got us over a barrel. Have you any suggestions?

Answer—This is a most interesting possibility. Many manufacturers of preserves are using vacuum pans but most, as far as we know, are operating on a batch basis. However, we do believe that instrument manufacturers have given considerable study to this problem, and will be glad to cooperate in your attempt to solve it.

Because of the necessity for extremely accurate control of the product composition, the most important step is to devise a method of continuously measuring the soluble solids content of the finished product. In the past year or so, some progress has been made in developing a refractometer for continuous gaging of the solids content of such products.

Another encouraging approach is determining the boiling-point rise by simultaneous temperature measurements of product and vapor in the vacuum pan. This leads to the need of close control of liquid level to avoid varying hydrostatic heads and absolute pressure in the vapor space.

You can readily see that the instrumentation required is rather complex. And by the time you get an estimate of its cost, you may question whether the investment would be justified economically.

Changes in Leavening Action

Question—Can you help us pin down cause of a difficulty plaguing some of our packaged cake mixes? With no changes in formula or ingredients that we know of, some batches do not have sufficient action. This condition appears worst during the summer.

Answer—Your trouble could be attributed to a loss of leavening action caused by what suppliers of these agents have termed "premature reaction"—a reaction between bicarbonate and acid agent in packaged state which reduces amount of gas evolved at the time mix is finally used. This, in turn, may be due to too fine a granulation of bicarbonate, which causes it to react more rapidly.

It would be well to consult with the suppliers of your leavening materials to see whether a coarser product could be used. It will be necessary to use caution, however, as you cannot go beyond the point where undissolved particles might remain in the finished cake.

Another possible cause of pre-mature reaction might be granulation of acid agent, for which the same remedy would be indicated.

High moisture content of mix might also produce this same effect and should be carefully investigated. The fact that your trouble is more prevalent in summer, when relative humidities are highest, suggests that product may be occasionally packaged with a slightly high moisture content, or that it may pick up moisture during its shelf life. Air-conditioning your mixing and packaging areas would be one way to overcome first, while second would require improvement of package itself.

On Stainless Steel Units

Question—Our laboratory found stainless steel very satisfactory for handling our products from two standpoints—resistance to corrosion and protection of products' flavor and color. We are considering standardizing on this material for future equipment purchases. But before doing so, would you pass on any information regarding

How Would *You* Do It?

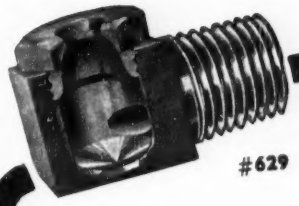
Readers are invited to submit to FOOD ENGINEERING answers to questions to "This Month's Problem." Selected answers will be published, with credit (unless you specify otherwise.) We pay space rates.

What Is *Your* Problem?

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

Write to Questions & Answers, Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

LESS CLOGGING WITH MONARCH



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possible limitations of stainless steel which should be taken into account?

Answer—The admirable properties of 18-8 stainless steel qualify it for a wide variety of applications in the construction of contact parts on food-handling equipment. You are wise, however, to consider possible limitations. Failure to do so has sometimes resulted in disappointing equipment performance.

For example, heat conductivity of stainless is less than copper—a material it often replaces for cooking kettles and the like. Consequently, some increase may be noted in the cooking or heating time with a stainless unit.

However, it is fair to say that heat transfer depends upon over-all coefficient. This involves the resistance of liquid, gaseous films, and metal to heat flow. And the difference is not necessarily proportional to variations in the conductivity of metals being compared.

It is also true that the higher strength of stainless steel may permit the use of thinner wall tubing for heating coils than, for example, copper. Thus, stainless offsets, to some extent, its lower heat conductivity.

Obviously, what applies to heating also applies to cooling.

The problem of conductivity is not serious, provided it is recognized in advance and the design and selection of the equipment is taken into consideration.

Another point sometimes overlooked is the non-too-satisfactory "bearing" properties of stainless steel. Bearing properties refer to the contin-

---

Q.—Any chance of fungal enzymes losing their potency while being stored in our bread bakery?

A.—Not if they are in a dry form and kept at room temperature and in a dry room.

---

ual rubbing of one piece of metal with another, like a piston sliding inside a cylinder. In this instance, sticking or undesirable wearing may be encountered.

It would be well, therefore, to consider using alternate materials in conjunction with stainless steel, where mechanical design dictates.

Still another mechanical property of 18-8 stainless steels is their inability to be hardened. This makes them unsuitable for such parts as hammermill tips, which are subject to severe abrasive wear. Some stainless steels of different composition can be hardened, however, and you might find one with suitable corrosion resistance.

Occasional pitting of stainless steel equipment has been a surprise and disappointment to some users who

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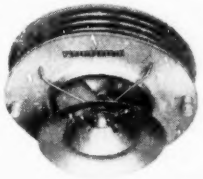

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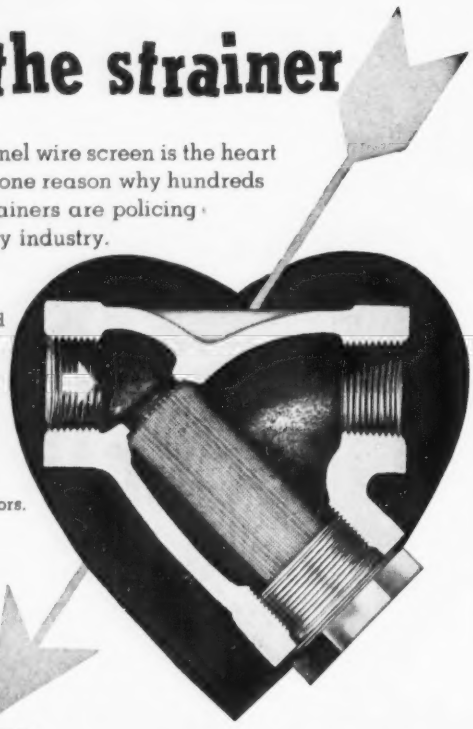

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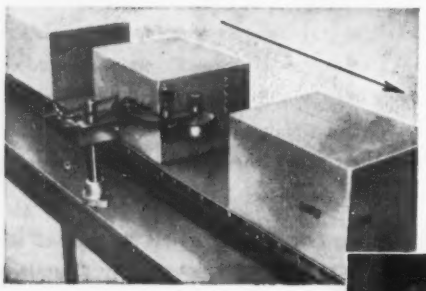
MARK ALL 4 SIDES OF CASES AUTOMATICALLY...*in a single pass*



New ROLACODER units attach to conveyor or sealer . . . imprint code-dates, lot numbers on all 4 panels of cases simultaneously . . . *without requiring cases to be turned.*

ROLACODER 500
imprints *front* and one *side* panel simultaneously

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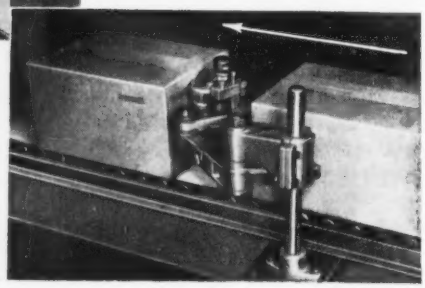
imprints *rear* and other *side* panel simultaneously



Write for new descriptive sheet ROL-1

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50TH YEAR

thought 18-8 stainless to be practically corrosion-proof. Actually, acid brines will pit this material. So-called type 316 stainless steel, however, is usually satisfactory for this purpose.

One final word of caution: Most stainless steels are non-magnetic. So if you are using magnets or magnetic traps to protect your products from accidental contamination by pieces of screen wire or tiny screws, you will find that they will not remove stainless steel particles. As a further safeguard, you will probably need metal detectors.

Making Quick-Dispersable Gum

Question—We have customers requesting a karaya gum that can be quickly dispersed in cold water. Is there a way of incorporating a water-soluble wetting agent with gum to make it more readily dispersable?

Answer—Some researchers have discovered that surfactants such as the Tweens (polyoxyethylene derivatives of partial esters of fat-forming fatty acids and anhydrides of sorbitol or mannitol) are effective in obtaining rapid dispersion of this powdered gum. It is quite possible that "aqualized" gums are prepared with Tweens.

For optimum results, it is necessary to obtain a good dispersion of this surfactant over the gum particles. This can be done by passing a good pre-mix of powdered gum and surfactant through a high speed hammermill.

Preparing Smoked Sausage

Question—Our firm is packing in 1-lb. cellophane bags a fresh, well-seasoned sausage, which we consider a specialty item. It is our intention to go into the production of similar items, which appeal to those who like well-seasoned or southern-style cooking. Could you, therefore, supply us with a formula for smoked, bulk pork sausage and information on how to prepare it?

Answer—Grind 150 lb. of fresh pork (70-75 percent lean meat) through a $\frac{3}{16}$-in. plate. To this add and mix: Salt, 3¾ lb.; sodium nitrate, 5¼ oz.; sage, 1¾ oz.; paprika, 3¾ oz.; and pepper (red), 6¼ oz.

Now stuff the sausage meat into 1-lb. cellophane casings, and smoke lightly—about 15 hr. at 90 deg. F.

If sausage meat is not seasoned enough to suit your taste, try varying the amount of sage, pepper, and paprika. You might also consider including additional spices, such as mace, marjoram, cloves, or ginger. Start with about ½ oz. of these spices, and then increase them to suit your taste.

Making Chocolate Syrup

Question—How can I proceed to make a chocolate-fountain syrup?

Answer—Blend, without lumping, cocoa powder, 40 lb.; sugar, 100 lb.; salt, ¾ lb.; Irish moss extractive (powdered), 6 oz.; and bicarbonate of soda, ¼ lb.

Add sufficient water (total amount 120 lb.) to dry ingredients to form heavy paste, and mix until smooth. Then add remaining water and Sweetose (enzyme-converted, 43 deg. Be. corn syrup), 125 lb. Heat, while stirring, to a boil. Then turn off heat and add enough vanilla to suit. Run syrup through homogenizer to produce a smooth product. Fill and seal in containers at 180 deg. F. Invert containers immediately to sterilize caps or lids, and quickly cool to about 100 deg. F. in a tank of cold running water or sprays.—*Formula from A. E. Staley Mfg. Co., Decatur, Ill.*

Q. Our packaged, frozen fish stick to freezer trays, which must be struck against the side of the packing table in order to release the packages. Many of our trays become damaged, too. Have you any suggestions?

A.—One application of silicone coating to trays will prevent sticking of frozen foods. A single treatment is reported to last for entire processing season. For more information, contact Dow Corning Corp., Midland, Mich.

Has Condensation Problem

Question—We have been troubled with severe condensation of moisture on ceiling in the processing area of our multi-story plant. This moisture, in turn, is creating a sanitation problem—we are plagued with mold growth. Condensation is attributed to open-kettle cooking in immediate area and storing frozen raw materials (for defrosting) on floor directly above. Can you suggest some means of overcoming this condensation?

Answer—We assume that defrosting period is necessary and that no other area is available for this purpose. If so, then there are two possible solutions to your problem.

First, prevent chilling of the ceiling by providing an air space between frozen goods and floor by stacking the materials on skids or pallets. By proper orientation of pallets (skids do not require such measures), virtual air ducts will be created under frozen goods. Floor-mounted fans can be used to maintain circulation of air.

If skids or pallets are unavailable, or extra stacking is uneconomical, you could install cork insulation on ceiling below. This insulation will maintain ceiling surface above the dew point.

Use of cork insulation is rather expensive. And before resorting to it, you should consider the second approach—reduce moisture concentration of the air in the processing area.

One method is to hood open cooking kettles, which are undoubtedly responsible for a large amount of water present in the room. Then connect hoods to an exhaust duct for drawing moisture-laden air out of the room. This might yield added dividends—improving working conditions during the warm weather.

Here's a final suggestion. Mount some high-velocity fans in a manner on ceiling brackets so as to promote a rapid circulation of air over the ceiling at all times. This would have the effect of hindering cooling of air to its dew-point, by reducing contact time between wet air and cold ceiling surface.

On Cooling Produce

Question—Can you furnish us information on a process which we understand has recently been developed for vacuum-cooling fresh vegetables?

Answer—Vacuum cooling is being employed to reduce the temperature of such products as lettuce, spinach, broccoli, celery, and salad mixes (the latter packaged in transparent, perforated bags). Lowering of temperature is from about 70 to 35 deg. F. within 20-30 min.

Principle used in cooling is to allow water to evaporate from the surface of the vegetables. In so doing, the water will absorb about 1,000 Btu's. for each pound evaporated and will thus cool, for example, about 100 lb. of lettuce 10 deg. F.

This principle is applied by putting vegetables in a vacuum chamber, sealed and evacuated to a pressure low enough for evaporation to take place. Multi-stage steam-jet ejectors may be employed to obtain the required vacuum. Since there is a relationship between the boiling point of water and absolute pressure within the chamber, temperature of produce may be controlled somewhat by amount of vacuum employed.

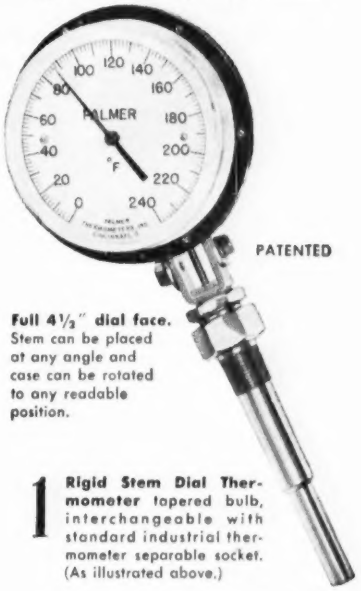
Various types of apparatus are used—from single chambers holding two pallet loads of vegetable crates to multi-chamber units with capacities of a dozen pallet loads per charge. However, total treatment time is likely to be longer in multi-chamber units.

Vacuums up to 29.8 in. may be employed. But to avoid damage to produce, it is customary to release the vacuum for a short time and then again reduce pressure. This procedure

PALMER

MERCURY ACTUATED

Dial Thermometers now in three types to suit any requirements

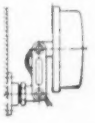


PATENTED

Full 4½" dial face. Stem can be placed at any angle and case can be rotated to any readable position.

1 **Rigid Stem Dial Thermometer** tapered bulb, interchangeable with standard industrial thermometer separable socket. (As illustrated above.)

2 **Wall Mounted Dial Thermometer** with flexible connecting armor. Case adjustable to easy reading position.



3 **Flush Mounted Dial Thermometer** for panel mounting with flexible connecting armor.

All three types have a full 4½" dial face.

for accuracy: Mercury actuated . . . Fully Compensated by Invar Compensaton. Guaranteed Accurate 1 scale division.

for angularity: Can be adjusted to most readable position at any angle desired.

for readability: Bold Black Numbers . . . 11" of scale Reading Dial face can always be placed in easiest readable position.

for interchangeability: Always specify "PALMER" Separable sockets as they are interchangeable for Dial or Industrial type Thermometers.

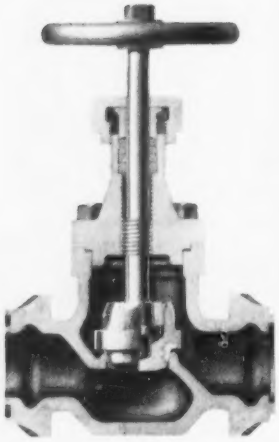
Send for Bulletin 51-129 for details on the New Palmer Dial Thermometer.

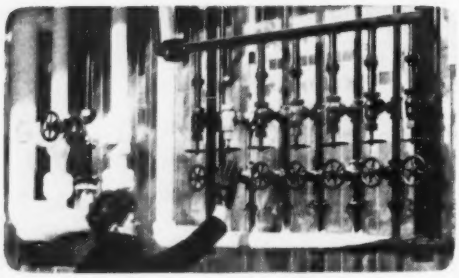
PALMER

THERMOMETERS, INC.

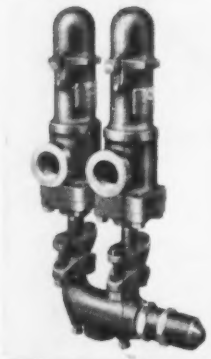
Norwood Ave., Cincinnati 12, Ohio

Mfrs. of Industrial Laboratory Recording and Dial Thermometers





For Superior Valves Specify FRICK



Whether for handling ammonia, Freon, or other gases and liquids at high pressures, you'll find Frick valves and fittings most dependable: a century of engineering experience is built into them. Sizes 1/4" through 14", with or without seal-caps; stocks in principal cities everywhere. Get the whole story on this superior equipment: write for literature.

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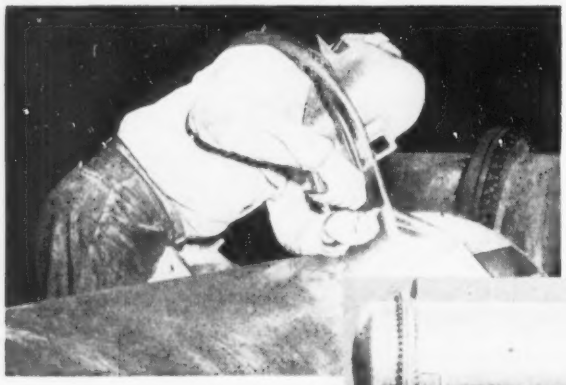
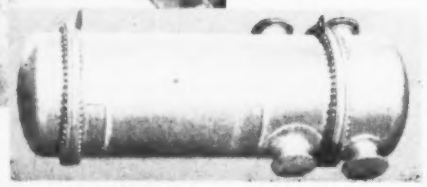


Here showing "Aircomatic" welding on Aluminum shell of a 54" o.d. x 10' fixed tube sheet Heat Exchanger. Inset shows the completed job of one of three such units on the order.



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DOWNINGTOWN'S Heat Transfer Division is under the direction and supervision of men thoroughly trained and experienced in this field. Our Engineering Consultation is at your service to aid you in preparation of plans and specifications for definite jobs.

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DIVISION OF PRESSED STEEL TANK COMPANY
Hackney

STEEL AND ALLOY PLATE FABRICATION AND HEAT EXCHANGERS

facilitates removal of heat from the interior of lettuce heads, for example.

Advantages gained are:

1. Dry packing produce in cartons on the field and cooling more cheaply than by moving to a central icing house.
2. Making rail shipments without need of top-icing produce. Not only would the shipper save on cost of ice, but ice burning, water saturating, and bruising of produce would be eliminated.
3. Producing cleaner and drier vegetables, better suited to prepackaging.
4. Extending shelf-life without refrigeration an additional 48 hr. Precooling by refrigeration may take 24 hr., during which time bacterial activity may take place.

Exploding Chocolate Creams

Question—We've just started a small candy plant and have recently run into some difficulty—the chocolate coating for our cream centers cracked in some instances and the soft cream portion oozed through the ruptures. Have you any idea what's causing this bursting and how it can be avoided?

Answer—This has been an old problem in the confectionery field that has been solved many years ago through the use of an enzyme, invertase.

Your problem is one of fermentation, which is brought about by the presence of yeast in cream centers. We understand these yeasts are sugar-tolerant, and react with sugar. One of the end products of fermentation, carbon dioxide gas is responsible for bursting the chocolate coating.

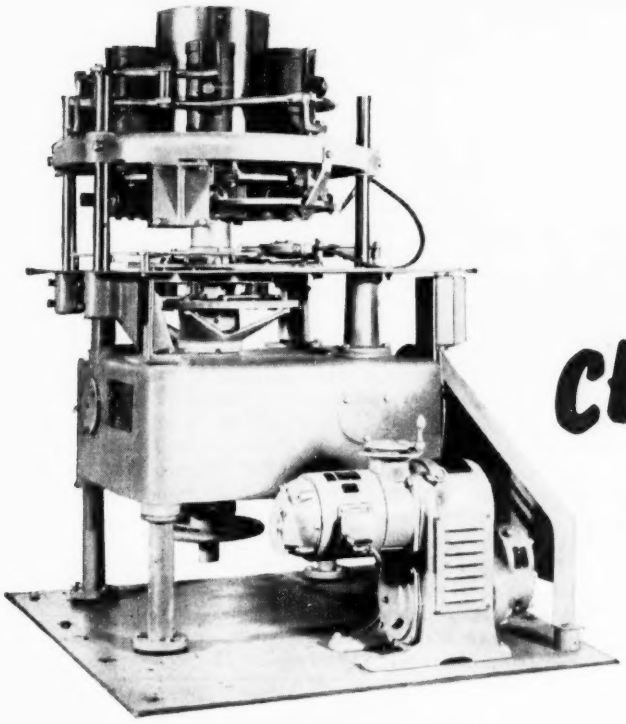
By adding invertase to your cream centers, on the basis of a few ounces to a 100-lb. batch, you can overcome this difficulty.

A word of caution, however: Do not add the enzyme until temperature of batch is below 165 deg. F., otherwise you will destroy its effectiveness.

Effectiveness of the enzyme is attributed to its ability to take up moisture in cream centers during the process of inverting, or breaking down, sugar. In this way, there is not enough moisture for yeasts to carry out fermentation, and their growth is thereby checked.

Q.—Will ordinary heat processing affect the taste of monosodium glutamate in canned soups?

A.—You will find that the flavor of other foods—peas, corn, beans, and the like—will change to a greater extent than the flavor of MSG.



NOW... CHANGE OVER IN 12 MINUTES

Less "down time" for changing can sizes with new adjustable head on RP-6 Filler

You can change container sizes quickly and easily with the new adjustable head on this Pfaudler RP-6 Filler.

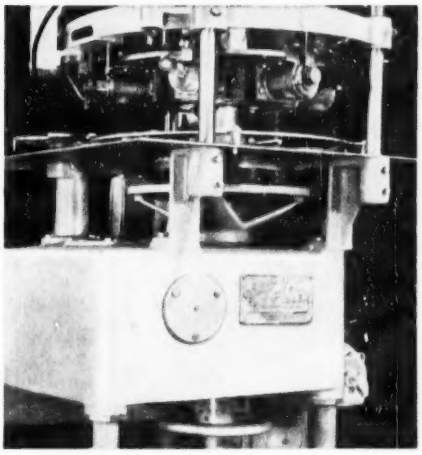
No special tools are needed—a simple turn of the hand wheel under the machine base does the trick in a minimum of time.

Under old hand methods, this took about four hours. Now you can change containers ranging in height from 2 to 7 inches in just 12 minutes. If you want to change both diameter and height, the maximum is 45 minutes.

At the machine's normal operating speed of 200 containers per minute, your savings in change-over time amount to at least 39,000 more cans ready for shipment each working day.

The RP-6 is a six-pocket filler designed for moderate sized packing operations. With it, you can fill containers to within 1/10 of an ounce accuracy. Perfect synchronization and "no-can, no-fill" feature prevent costly spillage. Cleaning is easy and thorough, because you can quickly remove pistons and valves without the use of tools. All product contact parts are stainless steel or copper free nickel alloy.

If you want steady production of 200 cans per minute—with minimum time lost for change-over—the RP-6 is for you. Mail the coupon for Bulletin 876, "Rotary Piston Fillers."



CONVENIENT HAND WHEEL eliminates need for tools when changing position of head for different sized containers. One man can quickly perform entire operation.

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Please send me a copy of Bulletin 876, "Rotary Piston Fillers," right away.

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For more information, use coupon on page 159.

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. . . you can make up all lengths of V-Belts quickly

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★ **Completely modern make-up units** that give you peace of mind as well as stock on hand.

★ **Less Stretch and Follow-Up Maintenance.** Just One Strong Joint.

★ **Alligator V-Belt Drive Units,** available in sizes A, B, C and D. B size furnished in display box.

★ **Order from your distributor. Ask for Bulletin V-215.**

FLEXIBLE STEEL LACING CO.
4646 Lexington St. Chicago 44, Ill.

Canning Fish Chowder

Question—Operations at our plant are limited to cutting fish fillets, which are then packed in 1-lb. units and frozen. However, we would like to expand our facilities by canning chowders and perhaps other fish products. Would you start us off by furnishing a basic formula for manufacture of a fish chowder as well as the method of preparing it?

Answer—Preparation of fish chowder is a two-step operation involving making broth and then cooking chowder.

To make broth, add about 1,000 lb. of fish heads and fillet trimmings (preferably from cod and haddock) to about 500 gal. of water in a steam-jacketed kettle. Simmer for 2-2½ hr. and then draw off broth into a holding tank.

Meanwhile, cook 13½ lb. of diced onions until soft. Now add 14 lb. of diced pork. While pork is being cooked, prepare, in a mixer, a slurry consisting of 19 lb. of flour and 12 gal. of water. After pork becomes soft, add 15 gal. of fish broth and the flour slurry.

Bring mixture to a boil and then add 15 gal. of broth. Again bring to boil and add a second starch-water blend—flour, 18 lb. and water, 7½ gal. Next introduce sufficient broth to bring the batch to 60 gal. Add 12 lb. of salt, and boil a third time.

Now run mixture to filling machine. Fill into No. 1 picnic cans containing 2 oz. of cod or haddock and 2 oz. of blanched, diced potatoes (preferably Green Mountain variety). Also add 1 g. of citric acid to prevent discoloration. Seal cans, process at 240 deg. F. for 75 min., and water-cool.

Aluminum Water Pipes

Question—Can aluminum pipes be satisfactorily used for handling water to be used for cleaning purposes in our fish-filleting plant?

Answer—If potable water is to be used from city-water main, the chlorine content should be less than 0.1 ppm. This concentration should not be harmful to aluminum pipes. Most municipal waters, however, contain such heavy metals as iron and copper, which are likely to cause pitting of the aluminum when in continuous contact with metal.

We understand that a large amount of aluminum piping is successfully used for irrigation work. Metal has not been attacked, even when water carries salts of heavy metals. In this case, water is carried intermittently, and air has frequent access to metal so that it "heals" any pits that may be formed.

Planning Rest Rooms

Question—In setting up new production facilities, we have encountered various opinions on providing rest rooms for male and female help. Can you suggest where we might obtain guidance on this?

Answer—To begin there are important books on industrial health engineering that go into considerable detail on this subject. A good one is *Industrial Health Engineering* by Brandt and published by J. Wiley and Sons, New York.

Manufacturers of sanitary fixtures offer considerable assistance to prospective customers in planning.

You may also be interested to know that associations such as those representing the canners and preservers have published recommended standards covering this subject.

Probably your best course of action is to consult local authorities and your state labor departments, as they will most likely have minimum standards that you must meet. These will cover the number of lavatories, toilets, urinals, and showers to be provided, based upon the number of employees who may be using the facilities at one time. At this point, consideration must be given to shift changes.

Although initial cost might be slightly high, it is considered good practice to construct washroom and toilet facilities with smooth, impervious floors and wainscoting. For this purpose, quarry tile and glazed ceramic tile are excellent. Ease of maintaining attractive and sanitary conditions makes these well worthwhile.

By way of illustration only, one highly industrialized state has specified toilet facilities varying from 1 for each 20 employees (up to 100 persons) to 1 for each 35 (500 to 1,000 employees). Lavatory facilities are to be provided on the basis of 1 for each 5, and showers 1 for each 15.

After determining the square feet to be devoted to these personal facilities, general type of fixtures, and construction, it would be well to consider how they are to be distributed throughout the plant. In some cases it has been found advantageous to scatter small units near work centers to reduce lost "travel-time" and, incidentally, to discourage their use as unauthorized smoking lounges.

Q.—What is considered to be the value of using inactive dry yeast in bread making?

A.—Makers of this new ingredient say its use will: Modify the physical properties of doughs, add nutritive properties, prolong bread freshness, and improve freshness and crust color.

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...why HERCULES POWDER COMPANY uses

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RHEEMCOTE

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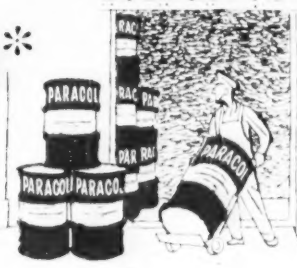

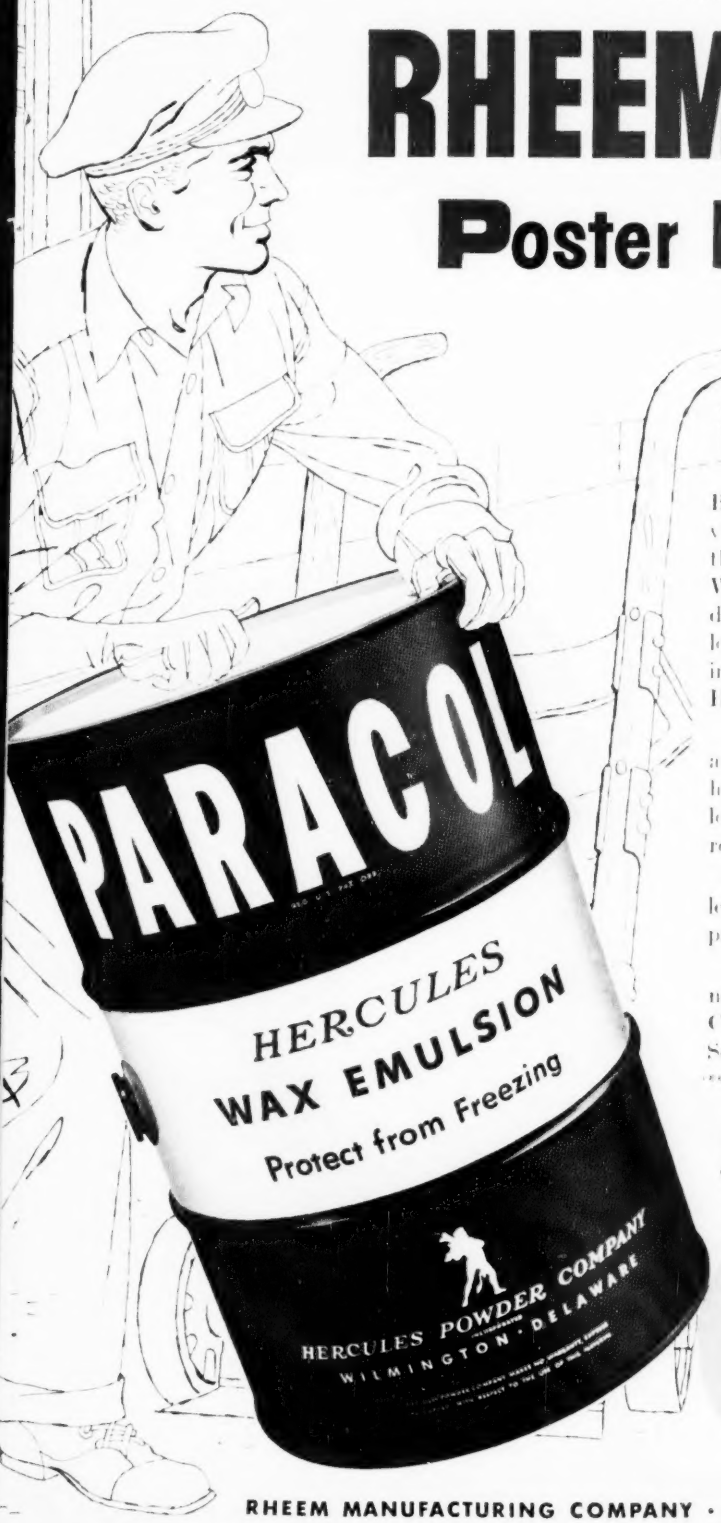

Because Hercules Powder Company knows the value of product and trade mark identification, they use Rheemcote Poster Drums to ship Paracol** Wax Emulsion. These sturdy top-quality steel drums make it easy for shippers and handlers to locate Paracol on piers and loading platforms and in warehouses. And they continually advertise the Hercules name in ports all over the world!

Rheemcote containers can be lithographed in any number of colors, any design, including halftones. The high-gloss finish is tough, long-lasting. When necessary, interiors can be roller-coated with special protective lacquers.

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Brilliant new design opens new era in trucking!

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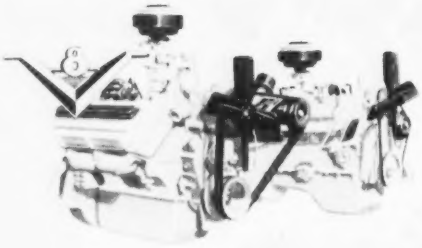
See their new low work-saving design!



2 GREAT ENGINE LINE-UPS! In addition to cost-cutting 6's, Dodge now offers the most powerful V-8 engines of all leading trucks! Available in 1½-, 2-, and 2½-ton models . . . standard in 2¾-, 3-, 3½-ton! Revolutionary hemispherical combustion chamber for high efficiency! Get free book on engine efficiency and its importance to you at your Dodge dealer's!

OVER 75 NEW FEATURES! Spectacular low-built lines! New increases in G.C.W.! New cab sealing against dust, drafts! Nonskid running boards!

PLUS famous Dodge features like . . . completely rustproofed sheet metal . . . moistureproof ignition! Truck-o-matic transmission with gyrol Fluid Drive, available!

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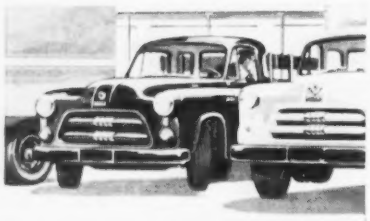

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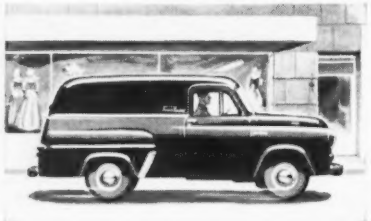
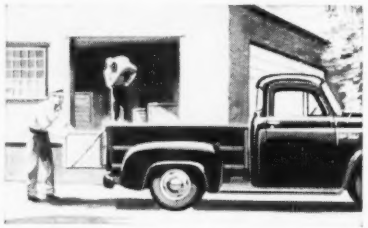


New! Smarter Styling! New colors! New flow-line design, featuring integral fenders, sparkling chrome! New two-tone interior styling! New wider doors! New easy-chair seats! New instrument panel.



New! Lower Lines! Pick-up and panel floors knee-high for loading ease! Lower running board for easier entry! Lower hood for greater visibility! New, low center of gravity for road-hugging stability!

SEE YOUR FRIENDLY DODGE DEALER!

Useful New Books & Government Publications

Science of Nutrition

BIOCHEMISTRY AND PHYSIOLOGY OF NUTRITION. VOL. I. *Edited by Geoffrey H. Bourne and George W. Kidder. Published by Academic Press Inc., 125 E. 23rd St., New York 10. 1953. 569 pages; 6x9 in., cloth. Price:* $13.

Written with the object of gathering together in one volume the most salient segments of nutritional research, volume will prove invaluable to the nutritionist and workers in the metabolism field as well.

Representing the past 100 years of research, the book includes chapters by noted specialists in the field of nutrition. Among these are Cathcart and Harris with a historical section by Goldsmith.

Special attention is given to treatment of enzymes and coenzymes, while the data on vitamin B and fat-soluble vitamins has been condensed due to recent exhaustive studies of those subjects. The book covers early development of nutritional science, history of vitamins, water and electrolyte metabolism, carbohydrate metabolism, amino acids, biosynthesis of proteins, lipid metabolism, and many other vital aspects of nutritional research.

The book is indexed according to author and subject, and footnotes provide a complete bibliography.

Facts on Small Business

SMALL BUSINESS MANAGEMENT. *A New York State Vocational & Practical Arts Assn. publication. Published by Delmar Publishers, Inc., Albany, N. Y. 1952. 213 pages; 8x10¼ in., paper. Price:* $2.75.

Covering the various practical angles of running almost any type of small business, book includes chapters on business law, finance, business forms, shop layout, and employer-employee relations. It is illustrated with suggested record forms and diagrams.

Presented in text-workbook form, each chapter concludes with a brief quiz to refresh the reader's mind. Book is indexed and contains a handy glossary of trade and business terms.

Defense Contracts

ACCOUNTING GUIDE FOR DEFENSE CONTRACTS. *By Paul M. Trueger. Published by Commerce Clearing House, Inc., 214 N. Michigan Ave., Chicago 1. 1953. 336 pages; 6⅝x9⅝ in., cloth. Price:* $7.50.

Offering a specialized approach to industrial dealings with the armed services, book is a thorough and comprehensive manual for accountants. While mapping out government positions on technical and controversial points, author explains reasons for these steps and just what is expected by the government.

Types of government contracts, recording purchases, manufacturing and engineering overhead, contract termination, and many other complicated aspects of defense work are fully treated.

Four appendices present copies of completed contracts and texts of pertinent laws. Indexed.

New Edition of Manual

TRANE REFRIGERATION MANUAL. *Prepared and published by Trane Co., La Crosse, Wis., 1953. 125 pages, 8½x11 in., paper. Price:* $1.50.

Completely revised and including two new chapters on refrigeration piping, manual offers practical and easy-to-understand information on installation, operation and servicing of refrigeration equipment. A new chapter on refrigeration system control, a revised chapter on service operation and a revised refrigeration system service analysis chart are also to be found in this second edition of the manual.

Beginning with a discussion of refrigerants and refrigeration cycle, book also covers selection installation and servicing of refrigeration equipment from evaporators to heat exchangers. Book is illustrated with photos and drawings and contains an index and glossary.

Foam Reference

FOAMS: THEORY AND INDUSTRIAL APPLICATIONS. *By J. J. Bikerman. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 36. 1953. 347 pages; 6x9 in., cloth. Price:* $10.

Complete and comprehensive, book is comprised mainly of data on chemical and physical properties of foam, with latter chapters devoted to applications of foam in industry.

According to author, a well-known foam authority, book is designed to aid scientists who "intend to profit by

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foam, or are plagued by it." A critical treatise, volume is reported to be the only complete treatment of the subject.

Indexed and supplemented with extensive bibliographies, the work is of particular interest to those in the beverage industry.

Statistical Engineering

ENGINEERING STATISTICS AND QUALITY CONTROL. *By Irving W. Burr. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. 1953. 442 pages; 6x9 in., cloth. Price $7.*

Backed by twenty years of teaching experience, the author has written a sound and practical text for advanced students of engineering and science. The application of statistics in industry and engineering research is explained deftly, with equal emphasis on both theory and practice.

Frequency tabulation as a useful tool, averages and variability, the normal curve, and a method for fitting and testing goodness of fit, are all included. Book is indexed and illustrated with photographs, sketches, and graphs.

Government Publications

TECHNICAL PUBLICATIONS ON RICE AND RICE OIL. *14 technical bulletins. Southern Regional Research Laboratory, 2100 Robert E. Lee Blvd., New Orleans.* Subjects include the formation of free fatty acids in rice bran during storage and methods of meeting problem; various aspects of processing and utilization of rice oil; chemical composition of rice, bran, and oil; a compilation of more than 300 abstracts of references from world literature between 1876-1951 on rice, bran and oil, and a critical review of 251 reference on the chemical composition of rice.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered directly from the Bureau responsible for its issue.

RAW GARBAGE SPREADS ANIMAL DISEASES. *Unnumbered leaflet, Bureau of Animal Industry, USDA, Mar. 1953. 3 pages.* Points out that proper heat treatment of garbage fed to livestock and poultry can cut animal disease losses, particularly vesicular exanthema in swine.

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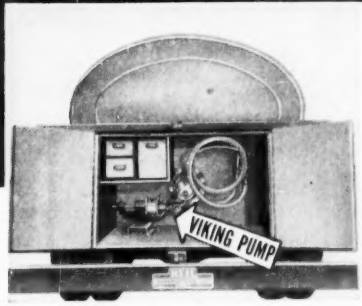

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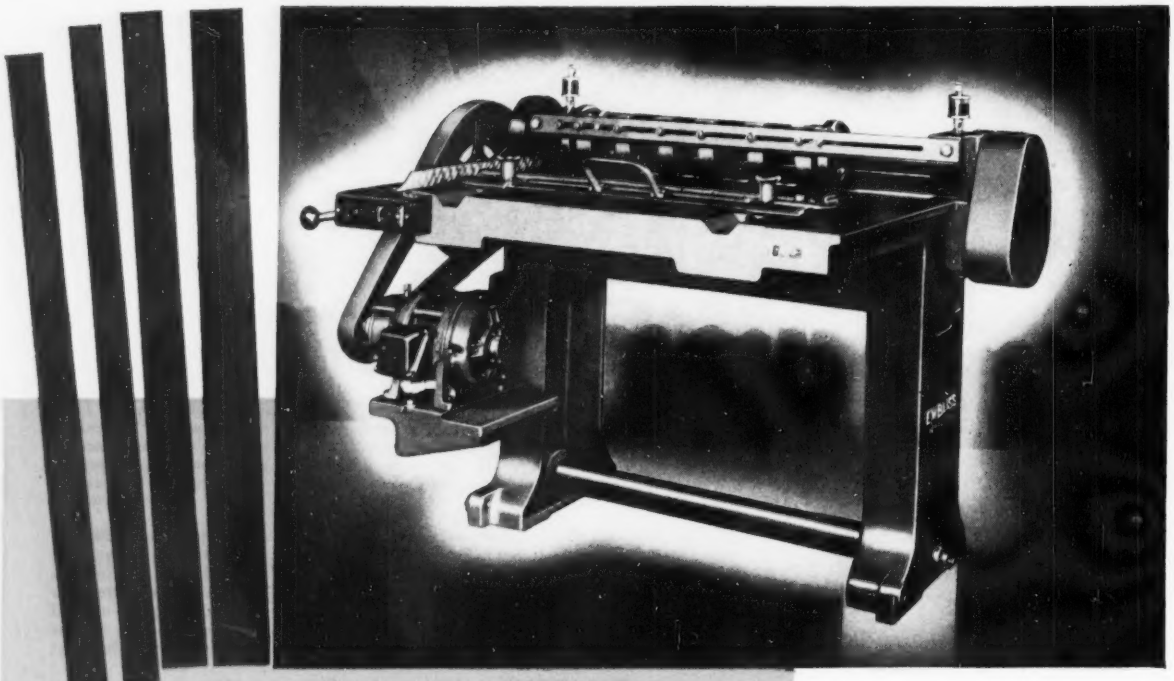

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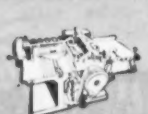
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Technical News • Washington Highlights • Economic Trends • Labor Developments

"Antibiotic" Ice

Flake ice containing only 1 ppm. of aureomycin (chlortetracycline) shows great promise for lengthening the storage life of fish.

So reported H. L. A. Tarr, of the Pacific Fisheries Experiment Station, Vancouver, B. C., at the American Chemical Society's 124th annual meeting.

Of 15 antibiotics previously investigated, only aureomycin and terramycin were effective in preserving flesh foods. Preservation effect was noticeable only from freezing temperatures to about room temperature.

Hormoned Sugar Cane

About half of Hawaii's sugar plantations are now experimenting with the hormone, malcic hydrazide, to suppress first-season cane tasseling (known to have a retarding effect on stalk growth) and thus up the yields of sugar.

The m.h. is being sprayed on the cane by airplane, with more than 300 acres involved.

Evaluations in terms of sugar increase must await actual harvesting, according to Dr. George Burr, principal physiologist and biochemist, HSPA experiment station.

Now It's Orange Cartons

For packing oranges, a new style cardboard carton makes possible abandonment of tissue wrapping. It is being used by Plancentia (Calif.) Orange Growers Assn. Cartons are one-half size of conventional wooden boxes, weigh 40 lb. filled. Heavy fiberboard is inserted around sides to strengthen carton. Liner is impregnated with byphenly to combat decay.

Form Pan-Glazing Group

Aim of the recently established Independent Pan Glazing Assn., Inc., is to provide bakers with better service on their pan-glazing needs by pooling all technical know-how.

President is C. F. Dinley, Metal Cladding, Inc., Buffalo and executive secretary is John Chesnik, with officers at 546 S. Longwood St., Baltimore 23, Md.

Packagers Reveal Latest Strides In Line Performance, Testing

Over 1,200 members of the Packaging Institute learned of the newest developments during their recent 15th annual 3-day forum in New York City. Briefs from outstanding sessions follow:

Standards for Machine Maintenance—G. M. Woodruff, General Foods Corp., suggested installation of a 360-deg. graduated dial on a shaft for conveniently checking timing and adjustment of machine parts. Using dial as a tool, a standard chart can be set up as a guide for operators and adjusters. Machines can then be periodically audited to insure maintenance of proper settings.

Equally important is to set standards on tolerable wear of machine parts. In so doing, it will be possible to anticipate necessary replacements or repairs before they affect operating efficiencies.

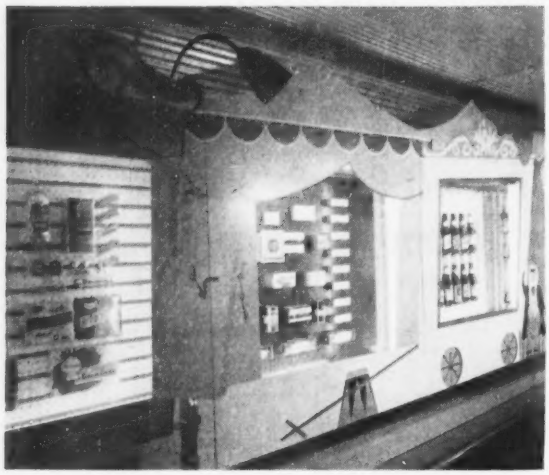
Fill-Height Inspection—Use of the cadmium sulfide crystal as an X-ray detector to monitor fills of sealed cans has brought accuracies of ± $\frac{1}{64}$ in. at 900 per min. speeds, reported H. Scheiber, General Electric Co., Milwaukee. Soon to appear is an X-ray inspection unit for checking fill height of liquid milk packed in waxed paperboard containers.

Checking Lithographed Can Labels—M. J. Reid, Eastman Kodak Co., Rochester, N. Y., discussed an automatic checking device his firm has developed for rejecting from a line any can with an improper lithographed label (one with different code marks). Through areas where code marks are lithographed on the side of the can, electric current can flow. Contact is made through seven horizontal wires along which cans rotate in vertical position. Wires are set to selectively pass or reject cans with various arrangements of code marks. Two wires identify a particular can. The remaining five wires provide a no-signal voltage when the solder joint is in contact with them, thus re-setting the mechanism and also operating the reject unit (when wires pick up a signal from the code area).

Weight Control—A new method of automatically graphing and computing weight control data was revealed by L. Folwell, Scale Specialists & Systems, Inc., Roseland, N. J. Each

Plastic Milk Truck Cuts Weight 50%

Lighter yet strong and resistant to weathering, rusting and denting, this new 4,000-gal. one-piece plastic milk truck was recently delivered to Dairymen's League Cooperative Assn., Syracuse, N. Y. Made of polyester resin in one operation, by a method developed by Marco Products Dept., Celanese Corp., the tank employs Fiberglas cloth and mat, 2-in. ply of balsawood, and a thin inner sheet of stainless steel. Supporting skirts were molded as an integral part of tank. Tank is 27 ft. long, 58 in. high, 18 ft. in circumference. It is mounted on a special frame that provides air suspension rather than springs.



Foil Packages, Glass Piping Displayed "On Wheels"

"Show-'em-how" trailer exhibits, to acquaint potential customers with foil products of Reynolds Metal Co. (left) and Pyrex equipment of Corning Glass Works (right) have now set out on grand tours. Reynolds 30-ft. trailer, called the "Packaging Bandwagon," has built-in movie and slide projectors and illuminated wall displays showing 160 aluminum-foil packages now in use. Corning's unit, 34-ft. long, is going directly to processing plants with the complete story of Pyrex pipe and its use.

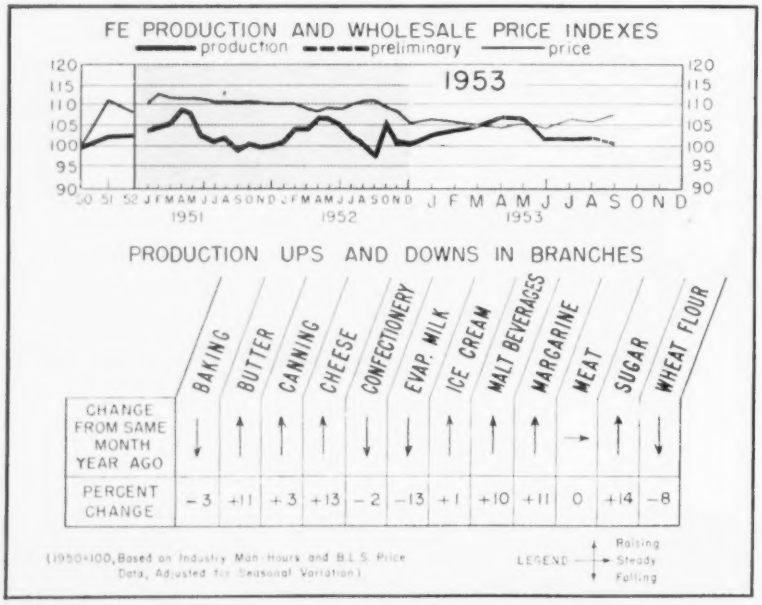
test weight is graphed on a 6-in. strip chart. Group lots are also automatically calculated and displayed on chart. Electric counters integrate over- and under-weights and record total counts.

Package Testing—A. H. Twardowicz, The Lord Baltimore Press, reported on a simple spot-reaction test for rapidly indicating susceptibility of a printed package to alkali contacts.

F. L. Wurzburg, Jr., Interchemical Corp., declared that the GE recording spectrophotometer was the only instrument used to any appreciable extent in the maintenance of working standards for color control in packaging. In recent years, there has been increasing use of simple photometric or densometric measurements for control of ink-film thickness.

J. M. Ramsbottom, Swift & Co., proposed a test for evaluating a printing ink's resistance to bleeding, transfer, rubbing, fading, or other color changes resulting from contact with packaged products containing free oils and fats.

E. J. Monahan, National Biscuit Co., described an instrument developed by his firm to measure the force required to hold formed-carton scores at rectangles. Need of such an instrument has been urgent, since a poorly scored carton will spring out of position and can cause jam-ups and downtime on a packaging line.



New Packaging Films

Two entirely different packaging materials have recently been developed—but as yet only for experimental purposes.

One is irradiated polyethylene produced by GE at Pittsfield, Mass., by bombarding "poly" with high-energy electrons. Thus, properties of the plastic have been changed, most notably its resistance to high temperatures—over 300 deg. F.

Whether this modified "poly" can be used as a plastic "can" for thermal-processed foods isn't yet known. But processors may find it suitable as a coating for paperboard trays for brown-n'-serve rolls or other type foods re-heated in the same package.

The second film is a two-directional oriented styrene recently developed by Plax Corp., W. Hartford, Conn. It is reportedly rigid and highly resistant to moisture.

Dairy Congress Line-Up

Preliminary roster of international experts to appear at the World Congress for Milk Utilization, scheduled Nov. 20-21 in Washington, includes Dr. Karl Brandt, associate director, Food Research Institute, Stanford University; Dr. Jacques May, American Geographic Assn.; and Dr. Egbert de Vries, International Bank for Reconstruction & Development.

Sen. Alexander Wiley (Wis.) is honorary chairman and will deliver the keynote address. Others serving with him include Foreign Operations Administrator Harold E. Stassen, Sec-

retary of Agriculture Ezra Benson, Dr. S. H. Work of the F&AO, Dr. Harry C. Trelogan of the Agricultural Research Administration, and Lester Olsen and Robert Rosenbaum, DISI officials.

Purpose of the meeting is to spotlight the problem of hunger facing two-thirds of the world's people while the other third has a surplus of dairy products.

Brewer Groups Honored

National Safety Council awards have gone to the U. S. Brewers Foundation, Inc., and Dominion Brewers Assn. Cited were the performances of these associations in providing safety services and their prevention activities in the sphere of publicity, conferences, contests, and publication of technical material.

Hors d'Oeuvres

▶ Bureau of Human Nutrition & Home Economics has developed a glass stomach. Just the thing for cross-country tourists.

▶ Exploding and toasting are "drastic" processes which impair the protein value of cereals, says a Scottish nutritionist. Shows the ignorance of people who don't see American TV programs.

▶ "Cheese of All Nations" retail stores in New York offer 367 varieties of cheese. Didn't know that mice had such refined tastes.

▶ A Gainesville Texan has invented a beehive containing jars into which the bees themselves pack the honey. Put on a cap and label, and the product is ready to sell. Progress has got to stop!

▶ If an A-bomb doesn't spoil your appetite, you might like the Atomic Emergency Food Box of Dorset Foods, New York. Its canned contents range from hash to vichyssoisse soup, to tickle any irradiated palate.

▶ Pepsi-Cola is selling ice cold beverage in Iceland, even when the thermometer reads 17 below. It hits the cold spot.

▶ Party Corn—kernels made crunchy and tasty by deep frying and salting—is coming on the market. Daniel Boone called it "parched corn."

▶ The new book "Road to Abundance" predicts synthesis of foods in chemical plants. But we say that most foods are too complex to be put together by molecule masons. Bet they can't even build the belch factor.

▶ Chemists really are going in the other direction. Recently they used fats as plasticizers in vinyl plastics. Now if they would only convert the butter surplus into raincoats.

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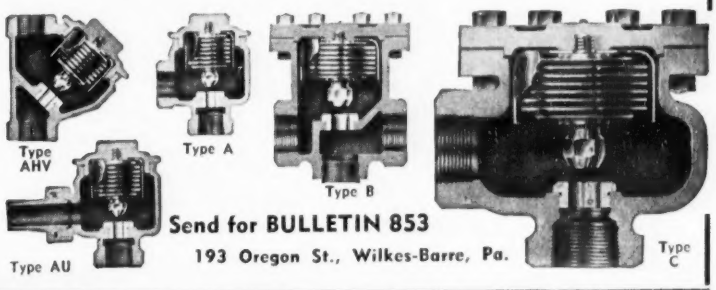

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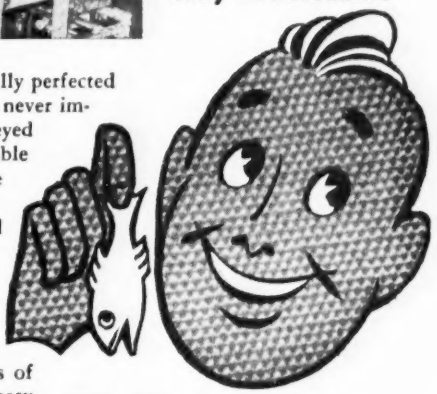

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Meat Packers Spotlight Problems, Developments, Trends in Field

Members of the American Meat Institute were briefed on significant meat-packing problems at their recent 48th annual convention in Chicago.

Particularly, papers on prepackaging of sausage products drew "standing room only" attendance. High lights:

Prepackaging—Most retailers and many packers indicate that more sausage and meat specialty items will be prepackaged at the packer level, reported, Vice-President G. M. Lewis of AMI. Reason is that assembly lines are essential for low cost production.

Concurring with this viewpoint was W. G. Andrews, The Grand Union Co., East Paterson, N. J., whose firm found direct deliveries from packers advantageous because: (1) No warehouse inventories are required, (2) warehouse losses are eliminated, (3) cost is no higher than store-packaged items, and (4) freshness is controlled through direct store contact by driver-salesman.

W. C. Purdy, Jewel Foods Stores, Barrington, Ill., pointed out that his firm was not nearly so much concerned as to how long prepackaged products keep but in how well they sell. To create acceptance, a freshness control program has been initiated. Prepackaged sausage items are delivered five times weekly in refrigerated trucks to warehouses between 2 and 4 P.M. Kept under refrigeration overnight, they are delivered next morning to stores. Coded packages not sold by the expiration date are destroyed. Responsible for this program are managers and district managers.

Packaging Costs—According to B. C. Tackeff, v.-p. of New England Provision Co., Boston, total cost per package of sliced luncheon meats run about 1⅜c., with the cost of the materials running about 1c. and labor ⅜c.

Broken down, the cost of materials per 1,000 is $3.00 for wrapping material (cellophane), $4.50 for labels (three colors, pictorial), and $2.25 for backing boards.

Required to operate a packaging line are a supervisor, two men feeding slicers, two girls check-weighing, two girls feeding wrapping machines, one girl dating and supplying labels to machine, and two girls loading packages into shipping cases. Total hourly labor cost (10 workers at $1.50 an hr.) is $15 to produce 2,400 packages.

The packaging line comprises four 400-slices-per-min. machines and a Wrap-King wrapping machine handling 40 packages (8 oz. size) per minute.

Packer's "Stake"—Only through volume can the packer economically install equipment better than that used in meat markets to reduce packaging costs, declared F. C. Danley, Armour and Company, Chicago. Prepackaged sliced luncheon meats must quickly pass to the consumer, with almost no break and little temperature deviation in the chain of refrigeration.

Equally important is the production of quality products made from the freshest raw materials and handled under ideal temperatures with specifically designed, sanitary equipment. High labor costs require the most advanced machines for slicing, stacking, weighing, wrapping, and cartoning.

Supply Outlook—J. R. Ives of AMI estimated a 24½ million pound meat production in 1954. If the expected 1953 increase in pig crop materializes, pork production for the calendar year will about equal this year's. And if cattle marketings are up moderately (a good possibility) beef and veal output will be slightly higher than this year's.

Slim Profits—Meat packers last year were only able to retain a profit of $0.006 per dollar of sales, reported H. H. Corey, Geo. A. Hormel & Co., Austin, Minn. Needed is more than the 4c. on the dollar received by the average manufacturer in the country last year—in order to provide the packer with sufficient funds for adequate research, new products, new machines, merchandising, and plant replacements.

Warehouse Construction—R. J. Epstein, A. Epstein & Sons, Chicago, described a method of preventing refrigerated warehouse floor and foundation upheaval due to frost formation in the sub-soil. Employed are grids of vitrified tile, acting as air ducts with gravity flow, laid in washed gravel below the sub-floor. Thermocouples, strategically located horizontally and vertically, are connected to a panel board in the engine room. If the temperature drops below freezing, heated air is introduced in the ducts.

New-Lard Complication

Detecting adulteration of dairy products with non-milk fats has been further complicated by new-type lard and tallow, in the opinion of Dr. W. F. Shipe, Jr., dairy professor at Cornell University.

"To meet this new problem," he states, "research is under way to de-

"Sterilized" Meat Products

Boned ham (A) and luncheon meat (B), seen at Chicago AMI exhibits, were specially "sterilized" by high frequency heating, and reportedly they'll keep in a closed pack without refrigeration. Color and flavor are called excellent, with no overcooked taste. Being weighed by AMI researchers is possibility of processing these meats in containers having non-conducting (glass or plastic) bodies—necessary since dielectric heating isn't feasible with metal cans. But also under study is aseptic transfer of meats from a processing cell to metal containers.

vise ways of identifying these modified fats."

He spoke at the 67th annual meeting of the Assn. of Official Agricultural Chemists in Washington. And in the course of his talk he reported progress with his method for detecting presence of domestic vegetable fats.

Italy Regulates Baby Food

Production and sale of baby foods and dietetic products in Italy are now regulated by a decree published in *Gazzetta Ufficiale*. And imported foods are subject to these new regulations.

Highlights: (1) Permit to market products must be obtained from High Commissioner for Public Health following inspection and approval of manufacturing premises and products. (2) Products must be sold in original parcels closed against tampering. (3) Packages must carry following information in Italian: Name and description of contents; name and location of head office of manufacturer and of factory in which packed; direction for use; analysis of product; net weight; date of production and length of time contents will remain usable; and date of decree authorizing production. (4) Preservatives must not be used without special permission.

Soviet Reports Strides In Food Technology

Moves by the Russians to advance their food technology are indicated by several items recently monitored from the Soviet radio by McGraw-Hill World News:

Automatic baking is stated to be carried out in a non-stop plant developed by the Research Institute of the USSR Baking Industry. Noted is inclusion of machines for weighing and regulating quantities of material, for mixing dough, and for baking the bread. A "sealing" of the units to insure hygienic standards is mentioned but not explained.

Powdered albumen differing little from egg white is to be mass produced from cod, according to the Moscow Fish Combine.

"Dry" rice not requiring the usual flooding is announced by Soviet plant breeders. The new variety is declared to need only five or six waterings during the season, thus making it possible to include it in crop rotations.

Photosynthetic formation of proteins as well as carbohydrates is reported established by the USSR Academy of Science (Plant Pathology Institute). Using marked nitrogen and carbon atoms, the researchers are said to have shown that during photosynthesis the relation between carbohydrates and proteins changes in accordance with the nature of the light source, its intensity, the age of the plant, and its nutrition.

Plant progress in '52 is described as including building or modernization of 100 food processing facilities. Scheduled for construction shortly are said to be a sugar refinery in the Ukraine and creameries in Uzbekistan and the Ukraine.

Output gains in the USSR remain unsupported by specific figures, but advancements are noted in these percentages ('52 over '51): Meat, 15 percent; condensed milk, 28; dairy products, 5; animal oil, 4; vegetable oil, 9; sugar, 3; cheese, 15; confectionery, 12; canned foods, 11; tea, 12; alcohol, 10; grape wine, 28; and beer, 6. Also, the Soviets say that amounts of canned foods, confectionery, and cereal products are now nearly double what they were in 1940, while sugar production is up 73 percent since that year.

Olympia Oysters Theatened

A mysterious blight is attacking *Ostrea Lurida*, the Olympia oyster, which grows only in Puget Sound. And some growers predict its extinction within two years unless there is effective remedial action. Washington State Fisheries Dept.'s shellfish laboratory is extensively investigating.

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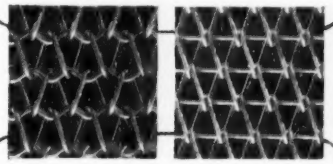

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Films Up Boxed-Fruit Life

How plastic film-lined boxes lengthen storage life of pears and apples was detailed by USDA scientists at the recent meeting of the Produce Prepackaging Assn. in St. Louis.

Many films were reported adequate for use with Bartlett, Anjou, Comice, and Bosc pears, but the tougher ones were found more resistant with use of box lids. Film packaging was recommended only for sound fruit washed in a fungicide and for part of the crop for late storage.

Pears sealed in film at 31 deg. F. could be stored one or two months longer than non-filmed fruit, and still ripen with excellent quality. Golden Delicious apples, which lose moisture easily and shrivel, benefit most from liners of polyethylene, Pliofilm, and others impervious to moisture. Generally, the liners should be perforated or slit when apples are removed from cold storage—to prevent off-flavors at higher temperatures.

USDA Grade Standards

Recent actions by Production & Marketing Administration of USDA, on U. S. Grade Standards and related activities include the following:

Canned Apples, third revision, p. 5525, Sept. 16 *Federal Register*, effective Oct. 16.

Egg products, minimum requirements for sanitation, facilities, and operating procedures in official processing and packaging plants, revised, p. 5583, Sept. 18 *Federal Register* (with corrections p. 6225, Sept. 30 *Federal Register*), effective Oct. 18.

Grapes, Sawdust Pack (European or Vinifera type), revised, p. 5619, Sept. 19 *Federal Register*, effective Oct. 19.

Chili Sauce, new, p. 5621, Sept. 19 *Federal Register*, effective Oct. 19.

Frozen concentrate for lemonade, new, proposed, time for written comments extended from Sept. 20 to Oct. 6 by a notice on p. 5665, Sept. 23 *Federal Register*.

Eggplant, revised, p. 6203, Sept. 29 *Federal Register*, effective Oct. 29.

Poultry, grading and inspection, basis of service, amended, p. 6227, Sept. 30 *Federal Register*, effective on publication (Sept. 30).

Annual-Report Honors

"Oscar of Industry" winner in *Financial World*'s 13th competition to determine the best annual report in the dairy products classification is National Dairy Products Corp. Second and third places were taken by The Borden Co. and Beatrice Foods Co., respectively. This is the fifth time in a row NDPC's annual financial report has been judged tops.

Printing Error

Two lines of type inadvertently were omitted from the Refrigeration Section of FE's October Anniversary Issue. Missing from the bottom of the first column, p. 128, was the line: "Cork and cork-board were the preferred insulation ma-"; and from the bottom of the second column, same page, the line: "In these package-type units, the wet ammonia gas is."

Briefly . . .

● DIETETICS. Newly established is a $750 scholarship, including tuition, to the New York Institute of Dietetics, donor being Mrs. Tillie Lewis, president of Tasti-Foods, Inc., and Flotill, Inc., Stockton, Calif. Basis of competition, closing Dec. 31, will be an essay, "Why I Want to be a Dietitian."

● FRESH JUICES, rather than canned single-strength juices, have fallen before the gains of the frozen juices, according to an American Can Co. survey. Whereas consumption of squeezed juices has dropped from 30% to 22% since '50, the canned variety has held its own at 48%.

● FIRST BAKING company to send its key personnel to exclusive sanitation courses given by the American Institute of Baking is Interstate Bakeries Corp.

● DAIRY SPECIALISTS from Switzerland are now in this country touring university dairy departments and industrial dairy concerns. Among the group of 21 are Dr. O. Langhard, director of the Swiss Cheese Union; Dr. P. Kaestli, head of the Swiss Federal Experiment Station for Dairy Industry & Bacteriology; and Dr. E. Zollikofer, head of the Swiss Federal Institute of Dairy Technology.

● A Materials Handling scholarship has been established at Illinois Institute of Technology, Chicago. The $650 full-tuition grant was set up by the Chicago chapter of the American Materials Handling Society.

● TIN CANS are among the articles that might be made by new mobile plants mounted on flatcars or trailers, according to *American Machinist*, McGraw-Hill publication. In this way, production could be carried out "on the spot" near the plants of buyers, to move on later to other demand centers.

● SANITATION HONORS have been accorded by the International Assn. of Milk & Food Sanitarians to Clarence W.

Schedule of Events

November

2–4—American Oil Chemists' Society, Fall meeting; Sherman Hotel, Chicago.
3–5—Packaging Assn. of Canada, annual convention, and Canadian National Packaging Exposition; Canadian National Exposition Bldg., Toronto, Ont.
3–11—First International Dairy Equipment Exposition; Parc des Expositions, Porte de Versailles, France.
8–12—National Milk Producers Federation, annual convention; Rice Hotel, Houston, Tex.
9–11—Grocery Manufacturers of America; Waldorf-Astoria Hotel, N. Y. C.
9–12—American Bottlers of Carbonated Beverages and International Beverage Exposition; Chicago.
9–12—Refrigeration & Air Conditioning Exposition; Public Auditorium, Cleveland.
11–13—Assn. of Food Industry Sanitarians, annual meeting and conference; Claremont Hotel, Berkeley, Calif.
20–21—Dairy Industries Society, International, World Congress for Milk Utilization; Statler Hotel, Washington, D. C.
30–D5—Exposition of Chemical Industries; Commercial Museum & Convention Hall, Philadelphia.

December

6–8—Chemical Specialties Manufacturers Assn., annual meeting; Mayflower Hotel, Washington, D. C.

January '54

14–15—Western Frozen Food Processors Assn.; Hotel Casa Del Rey, Santa Cruz, Calif.
18–21—Canadian Food Processors Assn.; annual convention; Alpine Inn, Ste. Marguerite, P. Q., Canada.
19–22—National American Wholesale Grocers Assn.; Atlantic City, N. J.
23–27—National Canners Assn., National Food Brokers, Canning Machinery & Supplies Assn., overall convention and annual meetings; Atlantic City, N. J.
25–27—National Dairy Council, winter conference; Peabody Hotel, Memphis, Tenn.
25–28—National Potato Chip Institute, annual conference and exhibition; Netherland Plaza Hotel, Cincinnati.
25–28—Plant Maintenance & Engineering Show; International Amphitheater, Chicago.

Weber, N. Y. State Dept. of Health, and Dr. E. F. Meyer, retired head of food control work in the Michigan State Dept. of Health. Mr. Weber received the Citation Award for his long and diligent work in behalf of the Association, while Dr. Meyer received the Sanitarians Award in recognition of his extensive promotion of dairy ordinances and key control measures in the field.

● MORE BEEF can be put on American tables through use of nitrogen fertilizers, according to indications in preliminary reports on Colorado's first pilot test in enrichment of mountain meadows. Applications of 100 lb. of nitrogen per acre have realized extra forage translating into beef in the ratio of $3 worth of meat per $1 worth of fertilizer. The studies are being continued by Colorado A. & M. College and federal agencies.

Technical Man

—Continued from page 96

there still remains the most difficult part of the technical man's task—putting the new development into actual operation. There can be no payoff until it is producing benefits in the plant.

A common tendency of technical men is to complete a nicely rounded piece of research, write a detailed report, and then sit back with a shrug of premature satisfaction.

Look Beyond Your Job

Another great failing of technical men in the food industry is complete absorption in science and engineering. With the tremendous flood of technical literature and meetings that flood the food field, it is difficult to find time for other interests. But it must be done.

Only with interest in, and knowledge of, other phases of the business operation, will you grow in stature and value to your company. Does your management have sound personnel policies? What rate of return should you get on the capital you are asking for the installation of your development? Is your company soundly financed? Ask yourself these questions, then go out and find the answers.

Wherever opportunity presents itself, the technical man should observe and study developments in outside fields. This means in other phases of the food industry, as well as in other industries. If the dairy branch of the industry has done a good job on sanitation, borrow sanitation tricks from it. If the canners have increased the productivity of labor, borrow a few of their ideas.

Above all, don't wait until management comes to you for a suggestion about improving operations or producing new products. The push should come from the technical group. Get out and wander around the operations and become thoroughly familiar with them. Then produce ideas for improving them either by reducing costs or by improving quality, or both.

When you do all this, you obviously won't have many hours left in your day. But you shouldn't; not if you are carrying your weight.

The next time you're unhappy about the steamfitter who is out-earning you, ask yourself critically if you are contributing more to the profitable operations of the company.

Maybe you aren't!

End *(Resume reading on page 97)*

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Photograph courtesy of American Can Company

Here's proof of improved flavor

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The flavor of meat from wheat

Recent Inventions

PRODUCTS

Vegetable Oil Resistant to Low-Temperature Clouding Through Enhancement With Materials from Zirconium and Zirconyl Soaps of Solid Saturated Fatty Series—*H. D. Royce to The Southern Cotton Oil Co., Savannah, Ga. No. 2,646,356. July 21, 1953.*

Protein Adhesion Preventing Coating for Food Containers Consisting of Film From Group Consisting of Rosin, Hydrogenated Rosin, Abietic Acid, and Mixtures Thereof—*A. C. Edgar, Palos Heights, Ill. to Wilson & Co., Inc., Chicago. No. 2,646,358. July 21, 1953.*

Stable Liquid Concentrate Derived From Grapes and Raisins Made by Hot Water Extraction of Pomace—*A. Shapiro, Kentfield, Calif. No. 2,647,058. July 28, 1953.*

Dehydrating Pineapple Juice by Disintegrating, Removing Pulp, Separating Remaining Heavy Pulp From Esters and Albumin, Dehydrating by Successive Freezings and Separations of Ice Crystals—*E. P. Wenzelberger, to The Commonwealth Engineering Co., Dayton, Ohio. No. 2,647,059. July 28, 1953.*

Preparing Wort by Extracting Hop Cones in Water, Treating With Catalytic Isomerizing Solution, Boiling, Then Adding to Wort—*V. Salac, Prague, Czechoslovakia, to Ceskoslovenske pivovary, lihovary a Konservarny, narodni podnik, Prague, Czechoslovakia. No. 2,647,837. August 4, 1953.*

Canned Ripe Banana Product Obtained by Saturating Slices With Syrup, Evacuating to Remove Gases and Removing Excess Liquid, Macerating to Puree, Continuously Heating to 158-19 deg. F. Under Pressure—*R. T. Stone, San Jose, Costa Rica, to Food Concentrates Inc., New York. No. 2,647,838. Aug. 4, 1953.*

Edible Cheese Product Comprised of Loose Morsels Coated With Whey Solids to Increase Brittleness and Resistance to Mold and Rancidity—*J. Krusi, Thayne, Wyo. No. 2,648,607. Aug. 11, 1953.*

Preserved Pimento With Firm Body, Bright Color, and Full Flavor Made by Lowering pH With Salt, Pasteurizing, Packaging —*E. Traisman, Des Plaines, Ill. and C. R. Price, Garland, Tex., to Kraft Foods Co., Chicago. No. 2,649,378. Aug. 18, 1953.*

Substantially Sugar-Free Fermented Beverage Made by Mashing Malt and Soybean Flakes, Heating, Adding Starch, Heating, Adding Corn Sugar in Brew Kettle, Boiling, Cooling, Adding Yeast, Storing at Low Temperature —*K. Franck, Terre Haute, Ind. No. 2,650,164. Aug. 25, 1953.*

Edible Lactose Product Made by Digesting Whey With Proteolytic Enzyme, Demineralizing by Ion Exchange—*F. H. Tinkler, R. C. Stribler, and J. G. Kennedy, Mason, Mich., to American Home Products Corp., New York. No. 2,650,165. Aug. 25, 1953.*

PROCESSES

Determining Bran and Germ Particles in Cereal Flours by Treating With Aqueous Crystal-Violet Followed by Alkali to Decolorize Other Particles—*R. A. Larkin, Peoria, Ill. to U.S.A. No. 2,642,745. June 23, 1953.*

Roasting and Salting Shelled Unskinned Nuts by Adding Salt Water, Enclosing Nuts and Solution Under Pressure, Raising to Boiling Pressure to Steam Roast the Nuts, Exhaust, Cool—*F. E. Hageman, Chico, Calif. No. 2,643,190. June 23, 1953.*

Cooking Rice in Presence of Moisture, Drying, Compressing While Warm, Puffing at High Temperature—*M. W. Alderman, W. F. Massmann, Jr., and E. W. Michael, Battle Creek, Mich. to General Foods Corp., New York, No. 2,643,951. June 30, 1953.*

Blocking Fish Fillets by Overlapping Between Opposite Confining Walls, Applying Pressure, Freezing—*H. E. Crowther, Watertown, and L. T. Hopkinson, Newton, Mass. to The Atlantic Coast Fisheries Co., Boston. No. 2,643,952. June 30, 1953.*

Link-Sausage Casing-Removing Process Employing Wetting Media to Stretch Casing and Fluid Under Pressure to Expand it Away From Encased Structure—*R. A. Schneider, Bridgeport, Conn. No. 2,644,982. July 14, 1953.*

Recovering Pectin From Beet Sugar Refinery Waste by Ion Exchange Employing Phenol Formaldehyde Cation Resin and Aromatic Amine-Formaldehyde Anion Resin, Washing Beds to Recover Pectin, Precipitating With Alcohol—*A. E. Bishop, Dayton, Ohio, to Superior Sugar Refining Co., Menominee, Mich. No. 2,647,890. Aug. 4, 1953.*

Treating Sun-Dried Raisins in Damp State With Sulfur Dioxide While Under Agitation—*E. Aliotti, Rhodes, Dodecanese, Greece, to Aliotti and Gier, Kansas City, Mo. No. 2,648,695. Aug. 11, 1953.*

Treating Raw Egg Whites to Decrease Whipping Time by Hashing in Container and Forcing Out Through Orifice—*W. E. Lloyd, Homewood, Ill. to Armour and Co., Chicago. No. 2,648,606. Aug. 11, 1953.*

EQUIPMENT

Poultry Picking Machine Employing Two Facing Rotary Drums, One Containing Long Flexible Fingers for Feather Removal, and Other Short Inflexible Fingers to Take Off Pin Feathers—*G. W. Johnson, Raytown, Mo. to Gordon Johnson Co., Kansas City, Mo. No 2,641,796. June 16, 1953.*

Beverage Brewing Apparatus Which Passes Predetermined Quantities of Heated Liquid Through Infusion at Controlled Intervals—*E. S. Clemens, New Orleans, La. No. 2,641,992. June 16, 1953.*

Ice-Cream Cone Dipping Apparatus Utilizing Movable Basket Supporting Dipping Tray and Tank—*A. D. Campbell, Whiting, Indiana. No. 2,642,029. June 16, 1953.*

Continuous Ice Cream Block Extruding and Freezing System Employing Flat Contact Surface Freezing Chamber With Means for Continuous Breaking of Bond Between Product and Supporting Strip—*R. Turner, Horsforth near Leeds, England. No. 2,643,526. June 30, 1953.*

Forced Draft Vacuum for Milk Dryers Employing Vertical Member With Two Feed Pipes Equipped With Blowers—*G. E. Shaw, Nellsville, Wis. No. 2,644,391. July 7, 1953.*

Rotary Type Extractor Feeder Employing Baffled Fruit Receiving Pockets—*L. A. Wells, Long Beach, Calif. to Brown Citrus Machinery Corp., Whittier, Calif. No. 2,644,568. July 7, 1953.*

Pitting and Stuffing Conveyor Apparatus Employing Buoying Feed Bath Discharged by Cup-Bearing Chain Mechanism—*M. E. Francisco, San Jose, Calif. No. 2,644,569. July 7, 1953.*

Oven Type Coffee Roaster With Plurality of Heating Zones and Air-Tight Rotating Roasting Tube With Controlled Gas Removal—*W. S. Scull, 2nd., Bryn Mawr, and G. A. Fisher, Selinsgrove, Pa. to Jabez Burns & Sons, Inc., New York. No. 2,644,681. July 7, 1953.*

Apparatus for Stripping Artificial Casing From Prepared Sausage Employing Convevors, Slitters, Gripping Means—*J. W. Ball to W. R. Gunderson and A. P. Broiles, Dallas, Tex. No. 2,644,979. July 14, 1953.*

Shrimp Deveiner and Splitter Utilizing Annular Recessed Opposed Abuting Disks and Rotary Cutter—*A. R. McKinstry, Brunswick, Ga. to Seafood Equipment Corp., Glynn County, Ga. No. 2,644,980. July 14, 1953.*

Bacon Slab Injector Employing Gang of Needle-Mounted Reciprocating Piston-Cylinders and Movable Integrated Platform—*S. T. Moreland, Indianapolis, Ind. No. 2,645,171. July 14, 1953.*

Photoelectric Inspecting and Sorting Apparatus Utilizing Conveyor With Photocell Inspection Lamps and Relay-Actuated Sorting Mechanisms—*C. T. Nemir, Washington, D. C. to The Kelling Nut Co., Chicago. No. 2,645,343. July 14, 1953.*

Egg Grading Machine Including Series of Tracks Feeding Selective Beam Balances—*R. J. Hayter, N. Hollywood, Calif. No. 2,645,344. July 14, 1953.*

Grain Aspirating Machine That Passes Product in Thin, Flat Stream Through Annular Air-Served Gap—*R. B. Dodds, Woodbridge, Conn. to The Safety Car Heating & Lighting Co., Inc., New Haven, Conn. No. 2,645,345. July 14, 1953.*

Apparatus for Extracting Sugar From Beets Employing Vertical Columns and Double-Wall Heated Screw Conveyor for Countercurrent Extraction Including Heating Zone—*E. Langen, H. Etzweiler, Elsdorf, Germany to Superior Sugar Extraction, Inc., New York. No. 2,645,589. July 14, 1953.*

Fish Fillet Splitting and Skinning Machine—*F. H. Jensen, Seattle, Wash. No. 2,645,812. July 21, 1953.*

PACKAGING

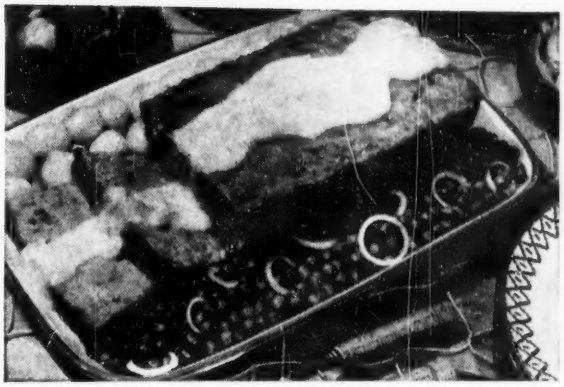
Paper Container Forming Machine Employing Turret, Mandrels and Plurality of Operating Stations Including Widening, Pressing, Mouth Spinning and Stripping—*B. A. Wittkuhns and H. G. D. Nutting, Summit, and G. F. Hill, Madison, N. J. to National Paper Bottle Co., inc., New York. No. 2,642,784. June 23, 1953.*

Egg Carton Assembling Apparatus Employing Perforator, Scorer and Roller, Folding Unit, Partition Feed and Clamp Mechanism, Stacker—*J. Gilchrist, London, Ontario, Canada to Robert Gair Co., Inc., New York. No. 2,642,786. June 23, 1953.*

Loaf-Enclosing Band-Type Bread Wrapper With Severable Portion to be Used as Credit Slip—*E. A. Wilsher and E. C. Roh, Grand Rapids, Mich. No. 2,647,334. Aug. 4, 1953.*

Filling Semi-Liquid Substances Into Container With Nozzle That Evenly Fills From Front to Rear and Wipes Contents Cleanly With Upper Edge of Container—*R. Kennedy, Jr. Drexel Hill, Pa. to Abbotts Dairies Inc., Phila. No. 2,648,476. Aug. 11, 1953.*

Want more information on any of these recent patents? If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers for those you want and enclosing 25¢ for each copy.



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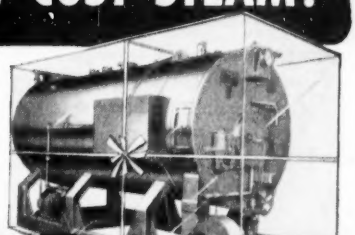

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Paygel is stable. It produces smooth eye-appealing product and has no cereal taste to mask flavors. And it's economical. See for yourself.

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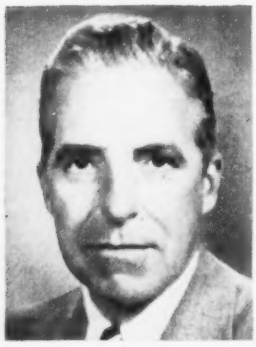
Men & Companies



Howard H. McCully has been elected vice-president, treasurer and director of Morton Packing Co., Louisville packers of frozen meat pies, after having been for five years Middle Western Division sales manager of Minute Maid Corp.

A. Barde Rogers has been named head of the Dairy and Poultry Section of the Research Division of Armour and Company, after having been with that company 12 years, during which time he worked on varied experimental projects.

Industry

American Association of Cereal Chemists opens new season with E. T. Palomba of Anheuser-Busch Inc., chairman; K. L. Fortmann, Wallace & Tierman Co., vice-chairman; Zenas Block, Doughnut Corp. of America, secretary-treasurer; and Robert Dowdle, Quality Bakers of America, Program Committee chairman.

Best Foods (Canadian) Ltd. plans to construct $200,000 building in Ayr, Ont.

American Bakeries Co. will erect bakery in Anderson, S. C. for baking of bread, cakes and specialty items.

Adele Candy Co., San Francisco, will begin operations Dec. 1. with Theodore A. White, president, and Neal V. Diller, vice-president.

Birds Eye Div. of General Foods Corp. announces appointments of Lowell F. Kruse as enginering manager in New York, and Robert E. Breedlove, manager of Birds Eye poultry plant in Pocomoke City, Md.

Canada Dry Bottling Co. has purchased assets and property of Canada Dry Ginger Ale, Inc, in Buffalo.

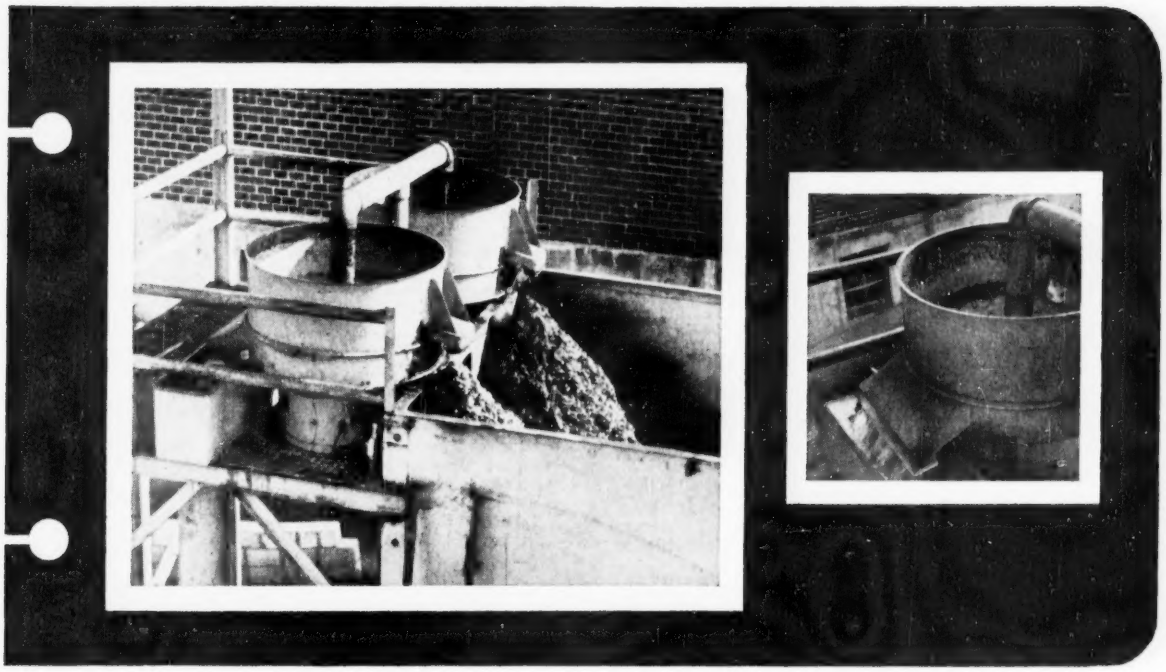
Corkran, Hill & Co., Baltimore, will build new processing plant and power house adjoining present plant of Swift & Co. affiliate.

Dow Brewery Ltd., Montreal, has purchased Ranger Brewing Co. of Kitchener, Ont. and plans to launch a $500,000 renovation and re-equipment program.

Durkee Famous Foods, has announced completion of re-

Sweco "3-D" Separators

solve another difficult water-pollution problem



Cannery waste

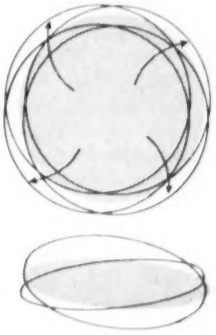
Pomona Products Company, Griffin, Georgia, replaced conventional screening units with SWECO vibrating-screen separators to meet stream pollution control requirements. Their old units were blinding; waste materials were over-flowing. Now—these two SWECO separators remove vegetable solids from a continuous flow of 900 gallons of waste water per minute, completely satisfying pollution control authorities... with a minimum investment.

If you have a water-pollution problem

If removal of contaminating solids from waste-wate is a problem in your plant, SWECO will make a detailed analysis and recommendation... *without cost to you.* SWECO vibrating screen separators are installed on a *guaranteed-performance* basis.

New "3-D" screening action

SWECO separators tumble the material *in all three directions at once.* Controlled spiral action increases capacity... increases screening accuracy... reduces blinding and clogging.



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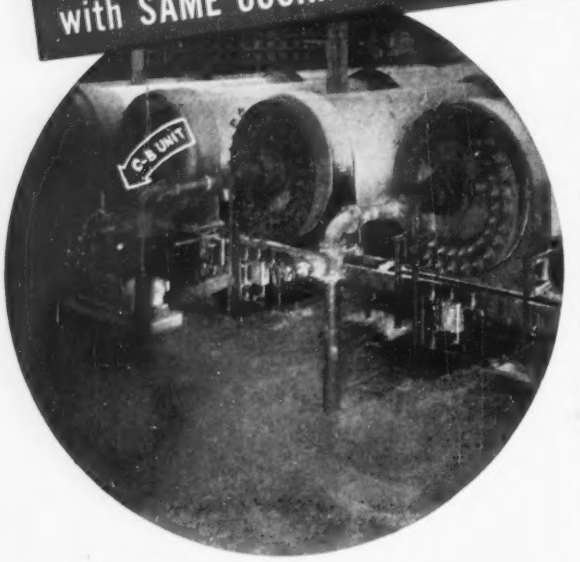

These dryers process citrus pulp. Production was increased 33⅓%. Moisture content of product was reduced from 6.5% to the required 5%.

"JET" Handling of Condensate does the trick

In the words of one Chief Engineer: "The Cochrane C-B System cut in half the time needed to bring caramels and creams to proper boiling point. This faster cooking cycle materially improved product quality and increased capacity 100%."

C-B Units are performing these quality and production miracles for food manufacturers from coast to coast.

In over 1700 installations the C-B is producing these same results. At the same time, it cuts fuel costs 10-20%, pares maintenance to a minimum and eliminates trap repairs.

The C-B "Jet" removes "insulating" layers of condensate from equipment instantly, continuously . . . assures fast, uniform heat transfer, eliminates cold spots, shortens cooking and curing cycles. Heat fluctuations are leveled-out, fuel costs lowered by returning condensate to boilers without appreciable pressure or temperature loss.

If you use steam in process, the C-B can help you. Write today for full details. Ask for Publication 3250. Your present operating conditions surveyed without obligation.

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Ted Jensen has been named new director of Bakery Service Division of Pollock Paper Corp., New York. Mr. Jensen's background includes 20 years of experience in the bakery packaging field, besides working as a designer and consultant in the development of automatic machinery for the textile, tobacco and food industries.

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frigeration facilities at its Macon, Ga., margarine and mayonnaise plant.

Fairmont Foods Co. has purchased Whitmore Creameries of Mitchell, Nebr.

Falk Quality Products Co. of Edgewater, N. J., suffered fire damage of $300,000 to warehouse and oil tanks.

General Foods Corp. started million-dollar expansion of Maxwell House Division coffee plant in Jacksonville, Fla.

General Mills plans to purchase one-story building in Toledo, O.

Green Giant Co. of Le Sueur, Minn., announced election of Earl Evan Crabb and O. B. Jesness as directors.

Hunt's Ltd., Ontario candy and baked goods firm, will be acquired by Canadian Food Products Ltd.

Libby, McNeill & Libby, food products company, announced the election of Harold W. Souther and Clinton L. Nelson as vice-presidents.

Nehi Bottling Co. will construct new plant in Birmingham, Ala. at cost of $400,000.

Pepsi-Cola's recently constructed bottling plant in Mineola, L. I., is now in production.

PictSweet Foods, Inc. has converted its last remaining canning plant at Mt. Vernon, Wash. to freezing operations.

Quaker Oats Co. has announced purchase of 24 acres near Harrisburg, Pa. for manufacturing and warehousing operations and also plans to build a central research laboratory in Barrington, Ill.

Rath Packing Co. has opened a new plant in Seattle.

Reaume Brothers plan to replace their canning factory at Chatham, Ont., destroyed by fire at a loss of $100,000.

A. E. Staley Manufacturing Co. has announced promotion of Louie E. Doxsie to materials and methods superintendent, James G. Dustin to production superintendent, and Oliver R. Etheridge to newly created position of technical consultant,

Utah-Idaho Sugar Co. completed $7 million sugar beet refinery, first major industrial plant in Columbia Basin.

Western Vinegars Ltd., Edmonton, Alta. is erecting a one-story concrete vinegar-making factory at estimated cost of $150,000.

Widemire's Inc. of Sylacauga, Ala. has merged operations with Foremost Dairies Incorporated.

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F. S. Leinbach, formerly secretary, assistant general sales manager and member of the board of Riegel Paper Corp., has been elected president of the Packaging Institute.

Personnel

Gordon R. Ball, president of Bank of Montreal, has been elected director of Ogilvie Flour Mills Co.

C. W. "Tex" Cook has been appointed assistant general manager of General Foods Maxwell House Division in Hoboken.

Hugh W. Daum has been elected president of the Central States Frozen Food Assn.

H. S. Dugan has been named administrative assistant to chairman of Borden's Chicago-Central fluid milk and ice cream district.

G. O. Fisher is new president of Gallatin Valley Milling Co., Bozeman, Mont.

Arthur E. Groth has been appointed general manager of Whatcom County Dairymen's Assn. at Bellingham, Wash.

F. Peavey Heffelfinger was named as president, and G. W. P. Heffelfinger vice-president, of F. H. Peavey & Co., pioneer grain firm.

Fred C. Heinz of H. J. Heinz Co., Pittsburgh, has been elected vice-president of the Quartermaster Assn.

A. D. Lewis is new secretary-treasurer and traffic manager of the Ozark Canners' Assn., with headquarters in Fayetteville, Ark.

Ben A. McKnight has been named manager of American Bakeries Co. plant in New Orleans.

W. E. Mitchell is new production manager for Kraft Food Co.'s Southeastern division.

Perry A. Noble was elected president of Southern Pecan Shelling Co., San Antonio.

W. J. R. Paton has been named production manager of Robin Hood Flour Mills Ltd., Toronto, Ont., in charge of the five Canadian mills.

Col. John D. Peterman has assumed command of the Quartermaster Food and Container Institute for the Armed Forces at Chicago.

Robert I. Presley has been elected president of North Carolina Bottlers Assn. at the annual convention in Asheville.

D. J. Purcell is new chairman of the Egg Solids Committee of the Institute of American Poultry Industries.

R. Dewey Stearns has been elevated to presidency of Peet Packing Co., Chesaning, Mich.

Dr. Betty Sullivan, vice-president and director of Russell-Miller Milling Co., Minneapolis, has been awarded American Chemical Society's Garvan Medal for 1954 for "distinguished service to chemistry."

Alex Tisdale will take over position of secretary of National Pretzel Bakers Institute at Pottstown, Pa.

J. Thomas Trixler has been appointed to the senior board of directors of Van Camp Sea Food Co., Portland, Ore.

Samuel Winokur has been re-elected president of the Tea Assn. of U. S. A. in New York.

P. C. Zinzli is new northern division manager for Golden State Co., California dairy, with headquarters in San Francisco.

Associated Industry

American Can Co. opened a new multi-million dollar plant in Lemoyne, Pa.

American Machine & Foundry Co. has acquired six products of the bakery equipment division of Bettendorf Co., and appointed Lawrence Leach manager of the New Haven plant and T. R. Dreyer director of manufacturing of plants in Brooklyn, Buffalo, Glen Rock, Pa. and New Haven, Conn.

Babcock & Wilcox has named A. B. Capron, assistant works manager, and Newell Hamilton, manager of steel operations in the Tubular Products Division at Beaver Falls, Pa.

Bemis Bro. Bag Co., St. Louis, has announced plans for new paper specialty plant at Crossett, Ark.

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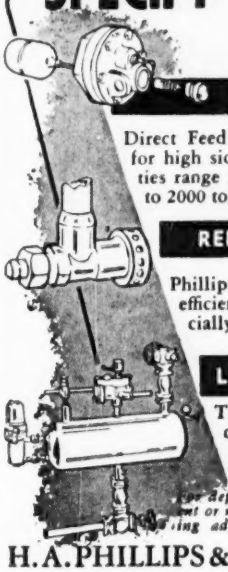
. . . for efficiency's sake . . .

SPECIFY PHILLIPS FLOAT CONTROLS



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Direct Feed and Remote Feed types adaptable for high side or low side applications. Capacities range from 1 to 1000 tons for "Freon"; 1 to 2000 tons for ammonia.

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Puts more richness in soup!

• Give your brand of canned soup a head start with Huron MSG. Wholesome, natural MSG is already boosting flavor—and sales—for fully half the canned soups on the market. Take a tip from the leaders. Write Huron's Technical Service Department for help on your particular flavor problems. The Huron Milling Co., 9 Park Place, New York City 7.

HURON MSG
PURE MONOSODIUM GLUTAMATE 99+%
Made by the pioneers in protein derivatives

For more information, use coupon on page 159.

Borg-Warner Corp., Chicago, has elected Harry P. Troendly to the presidency of the Spring Division.

Continental Can Co. has announced plans for expansion of the Memphis, Tenn. plant and in New York has named L. K. Hanson as general manager of its overseas division.

Dewey & Almy Chemical Co. has appropriated more than one million for additions to manufacturing facilities of plastic bags in plants in Cedar Rapids, Ia. and Lockport, N. Y.

Robert Gair Co., Inc., has received the Director's Safety award of the Folding Paper Box Assn. of America for its Piermont, N. Y. box shop record of one million man hours without a lost time accident.

Heyden Chemical Corp.'s Market Development Department in New York has made Ely Balgley supervisor of new products development.

National Research Corp. at Cambridge, Mass. has appointed S. Sydney Minault as Chief Engineer.

Orkin Institute of Industrial Sanitation, Atlanta, Ga., has named Joseph P. Blanks to its consultative staff.

Union Bag & Paper Co. has named William F. Jacobi as manager of its new Multiwall Machinery Department.

Vita Vex, Inc., North Kansas City, Mo., has announced the appointment of James Dwight Blucker to the company's nutritional staff.

Deaths

Fred Avalli, 38, co-owner of Hollister (Calif.) Canning Co. —Sept. 4.

Lawrence Edgecombe, 77, partner in Dunnville, Ont. canning factory.—Sept. 13.

Hans Peter Hansen, 77, founder of Idaho Creamery Co., past president of Idaho State Dairymen's Assn., and director of Challenge Cream and Butter Assn., Los Angeles, from 1929 to 1947.—Aug. 19.

John O. Larson, 39, director and executive vice-president of Fischer & Porter Co., Hatboro, Pa.—Sept. 18.

J. S. Swersey, 49, candy manufacturer who helped develop K-ration.—Sept. 28.

James Trevail, 67, more than 16 years manager of Vernor's Ginger Ale Ltd., Stratford, Ont. branch.—Sept. 9.

Gets real beef flavor

• For your canned beef stew, take a tip from the leaders. Many famous brands of beef stew are made with Huron MSG to give them a rich, "real beef" flavor. Boost your sales too with this same wholesome natural product. Our Technical Service Department will be glad to help you solve your particular flavor problems. Write today. The Huron Milling Co., 9 Park Place, New York City 7.

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Just Off the Press

New Catalogs and Bulletins from manufacturers of equipment and supplies —Free for The Asking—

Food Plant Equipment

Worm Gear Sets

Bulletin FCP-53 describes designs and typical applications of worm gear sets and speed reducers. 4 pages.—*Cone-Drive Gears, Div. of Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12.*

Circle 206A on Reader Service Card

Mixing Equipment

Catalog covers complete line of mixing and kneading equipment for all chemical process industries. 16 pages.—*Baker Perkins Inc., Saginaw, Mich.*

Circle 206B on Reader Service Card

Power Systems

Fifteen applications of hydraulic and pneumatic power systems are pictured and described in brochure. 4 pages.—*Rucker Co., 4228 Hollis St., Oakland 8, Calif.*

Circle 206C on Reader Service Card

Dissolving Equipment

Catalog covers line of dissolving equipment utilizing high speed impeller and interchangeable unit parts. 16 pages.—*Cowles Co., Cayuga, N. Y.*

Circle 206D on Reader Service Card

Juice Extractor

Features of operation and installation of automatic in-line juice extractors are given in colorful, illustrated booklet. 12 pages.—*Food Machinery & Chemical Corp., Lakeland, Fla.*

Circle 206E on Reader Service Card

Packaging Machinery

Two colorful pamphlets feature types of packaging machines, including several sealing crimpers and heat sealing unit packager. Each 4 pages.—*Wrap-ade Machine Co., Inc., 83 Valley St., Belleville 9, N. J.*

Circle 206F on Reader Service Card

Coil Holders

Folder offers explanations and photos of coil holders for wire stitching machines. 4 pages.—*Acme Steel Co., 2840 Archer Ave., Chicago 8.*

Circle 206G on Reader Service Card

Alloy Vessels

Details of research resulting in vessel lining and manufacture especially in pressure vessel field are given in Bulletin V-46. 20 pages.—*A. O. Smith Corp., Box 2023, Milwaukee 1.*

Circle 206H on Reader Service Card

Vaneaxial Fans

Bulletin J-611 describes design, uses and typical installations, along with specification charts, of adjustable blade, vaneaxial fans. 16 pages.—*Joy Manufacturing Co., Henry W. Oliver Bldg., Pittsburgh 22.*

Circle 206I on Reader Service Card

Magnetic Separators

Illustrated Bulletin 31 provides information on gravity, pipeline and underfeed electromagnetic separators for wet and dry materials. 6 pages.—*S. G. Frantz Co., Inc., Brunswick Pike & Kline Ave., Trenton 6.*

Circle 206J on Reader Service Card

Stainless Steel

Folder deals with workability and mechanical properties of recently developed stainless steel. 4 pages.—*Carpenter Steel Co., Reading, Pa.*

Circle 206K on Reader Service Card

Welding Fittings

Catalog 753 covers engineering and application data on steel butt welding fittings. 20 pages.—*Tri-Clover Machine Co., Kenosha, Wis.*

Circle 206L on Reader Service Card

Screw Conveyors

Comprehensive presentation of many types of screw conveyors and screw feeders is given in fully illustrated, tabulated Book 2289. 92 pages.—*Link-Belt Co., 307 N. Michigan Ave., Chicago.*

Circle 206M on Reader Service Card

Electronic Heater

Leaflet deals with crystal controlled frequency generator.—*Engineering Research & Development Co., Addison, Ill.*

Circle 206N on Reader Service Card

Relief Valves

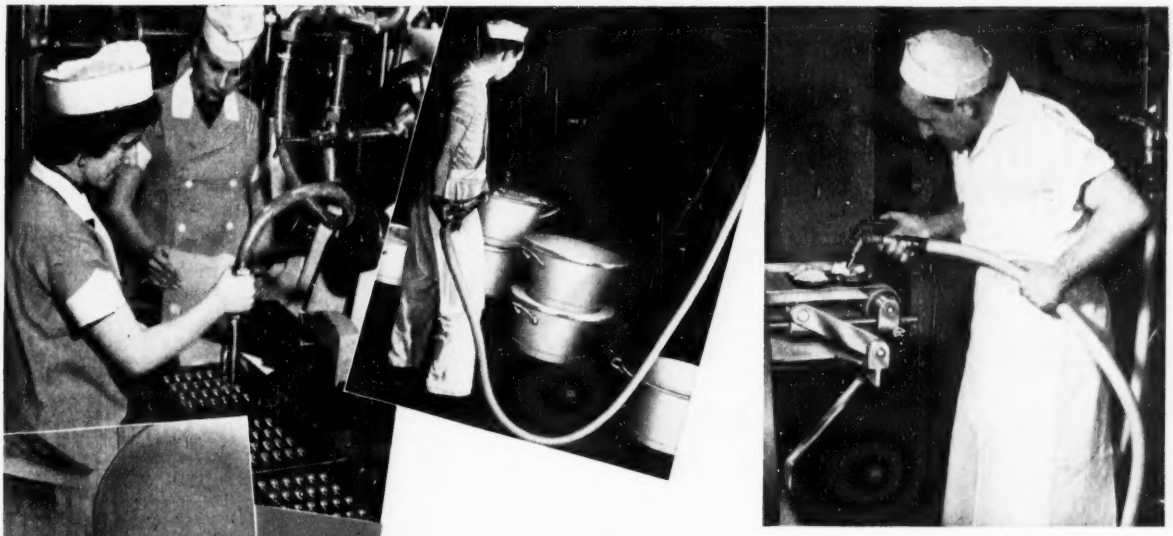
Booklet on selection and sizing of pressure relief valves to comply with ASME Boiler code requirements is offered for determining the output of boilers, tanks and heaters. 24 pages.—*McDonnell & Miller, Inc., 3500 N. Spaulding Ave., Chicago 18.*

Circle 206O on Reader Service Card

Dust Eliminator

Bulletin VU-8-53 describes two new wet type dust and dust eliminators. 4 pages.—*Schmieg Industries, Inc., P. O. Box 4701, Detroit 34.*

Circle 206P on Reader Service Card



Pipe liquid foods safely through *clear · flexible* TYGON PLASTIC TUBING

Less expensive than stainless steel, corrosion-resistant TYGON combines the best features of both rubber and glass *without* the disadvantages of either . . . the perfect piping for transmission of liquids or semi-solids!

Even the most sensitive foods as milk and ice cream are handled safely by chemically inert, non-toxic TYGON, without loss of taste or color. And flexible TYGON gives you the *solution visibility* of clear glass, without danger of breakage, cracking, or crazing. You have complete visual control of flow . . . a quick glance instantly tells you the level of your process material.

Fully flexible TYGON reaches from "anywhere to anywhere" — with less fittings, and less installation time. Lightweight, strong and abrasive-resistant, TYGON is a "natural" for your portable hose or tubing applications.

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- PIE FILLING
- ICE CREAM
- MERINGUE

TYGON CUTS MAINTENANCE COSTS IN HALF!

A TYGON line can be dismantled, cleaned, and reassembled in minutes. TYGON'S mirror smooth surface flushes easily clean. There is no crazing or checking to harbor bacteria. Strong detergents and cleaning chemicals leave it unaffected. It can even be steam sterilized, if desired.

TYGON TUBING comes in continuous lengths and in various sizes up to 2" I.D. Also available with braided reinforcement of stainless steel or fabric for pressures up to 300 psi.

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WRITE TODAY for Bulletin T-77 which gives you full particulars on money-saving TYGON Tubing.

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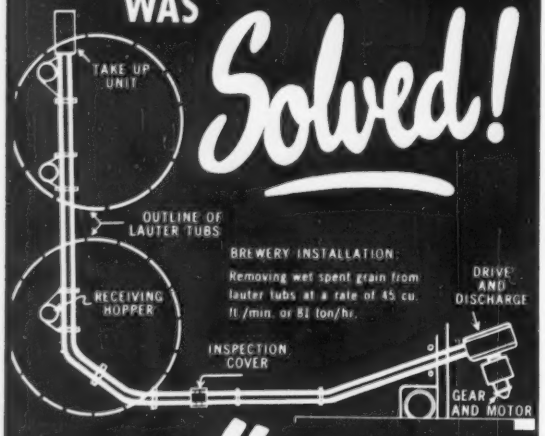
HOW ONE MATERIAL HANDLING PROBLEM WAS Solved!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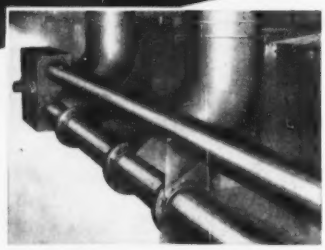
OUTLINE OF LAUTER TUBS
BREWERY INSTALLATION:
Removing wet spent grain from lauter tubs at a rate of 45 cu. ft./min. or 81 ton/hr.
RECEIVING HOPPER
DRIVE AND DISCHARGE
INSPECTION COVER
GEAR AND MOTOR

WITH A Hapman TUBULAR CONVEYOR



"Very satisfactory service" says brewery of this liquid-tight Hapman Tubular Conveyor which carries spent grains from two lauter tubs. This view shows discharge spouts and take-up end.

IF YOU HANDLE WET OR DRY FLOWABLE FOOD PRODUCTS, CONSIDER THESE UNIQUE HAPMAN ADVANTAGES:

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3. *Operate in any plane or angle* — around corners and obstructions without transfer points. Multiple feed and discharge points.
4. *Minimum clearance needed* — tubing is largely self-supporting. Better appearance, too!
5. *Amazingly low power cost* — low maintenance as well. Quiet in operation.
6. *Engineered to your specific requirements* — fully proved in plants now handling starch, flour, malt, ground fish, meat products and other foods.

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Hapman CONVEYORS, INC.
DIVISION HAPMAN DUTTON COMPANY
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Sealing Machine

News release and pamphlet describes heat sealing machine for manual or automatic feeding.—*Pack-Rite Machines, 407 E. Michigan St., Milwaukee 1.*

Circle 208A on Reader Service Card

Steel Chains

Bulletin 53-59 presents details and handy reference table for use of new chain series for drives and conveyors. 4 pages.—*Chain Belt Co., Milwaukee 1.*

Circle 208B on Reader Service Card

Steel Sprockets

Comprehensive data on steel sprockets and roller chains is given in Bulletin A-624. 24 pages.—*Dodge Manufacturing Corp., Mishawaka, Ind.*

Circle 208C on Reader Service Card

Volume Pumps

Bulletin 653 gives data on capacities, pressures, materials of construction and operating details of line of volume pumps. 12 pages.—*Milton Roy Co., 1300 E. Mermaid Lane, Philadelphia 18.*

Circle 208D on Reader Service Card

Electrical Vibrators

Leaflet gives detailed engineering data on high-precision electrical vibrators. 4 pages.—*P. R. Mallory & Co., Inc., Indianapolis 6, Ind.*

Circle 208E on Reader Service Card

Packaging Machine

Leaflet describes adjustable machine for bag making, weighing and filling.—*Package Machinery Co., Springfield, Mass.*

Circle 208F on Reader Service Card

Control Equipment

Electric Controls

Booklet features various types of custom-engineered electric control systems. 4 pages.—*Lake Shore Electric, Inc., 230 Willis St., Bedford, O.*

Circle 208G on Reader Service Card

Miniature Indicators

Bulletin 55-10 describes uses, installation and design features of remote miniature indicator and several warning devices. 12 pages.—*Fischer & Porter Co., 11A Jacksonville Rd., Hatboro, Pa.*

Circle 208H on Reader Service Card

Temperature Crayon

Pocketsize brochure presents uses for crayon, pellets, and liquid in indicating temperature. 6 pages.—*Burrell Corp., 2223 Fifth Ave., Pittsburgh 19.*

Circle 208I on Reader Service Card

Electronic Weighers

Bulletin 4106 explains how to weigh contents of tanks, bins and hoppers electronically and includes installation design considerations. 8 pages.—*Baldwin-Lima-Hamilton Corp., Testing Equipment Dept., Philadelphia 42.*

Circle 208J on Reader Service Card

Control Units

Comprehensive line of thermocouples, radiation detectors, resistance bulbs and many accessories for use with indicating, controlling, and recording instruments is shown in Catalog TC10. 42 pages.—*Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill.*

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Filter Models

Models of filter for liquid applications, including case histories, selector chart and hydraulic data are offered in booklet MK-0553. 12 pages.—*Cuno Engineering Corp., Meriden, Conn.*

Circle 208L on Reader Service Card

Humidity Control

Catalog K-151 contains data and diagrams of humidity control system. 4 pages.—*Surface Combustion Corp., Toledo 1.*

Circle 208M on Reader Service Card

Electronic Eye

Brochure deals with electronic sorting processes for use in coffee industry. 4 pages.—*Otis, McAllister & Co., 410 44th St., S. W., Grand Rapids 8, Mich.*

Circle 208N on Reader Service Card

Combustion Controls

Folder presents details of combustion control systems for coal, oil, and gas. 4 pages.—*Standard Instrument Corp., 350 Fifth Ave., New York 1.*

Circle 208O on Reader Service Card

Radioactive Reagents

Development, applications and instrumentation of micro-curie radioisotopes is subject of Bulletin FS-231. 11 pages.—*Fisher Scientific Co., 717 Forbes St., Pittsburgh 19.*

Circle 208P on Reader Service Card

Pyrometer Supplies

Pyrometer supplies are illustrated and described in comprehensive Catalog 100-5. 48 pages.—*Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44.*

Circle 208Q on Reader Service Card

Resistance Testers

Several types of electrical resistance testers are covered in illustrated bulletin 21-85. 8 pages.—*James G. Biddle Co., 1316 Arch St., Philadelphia 7.*

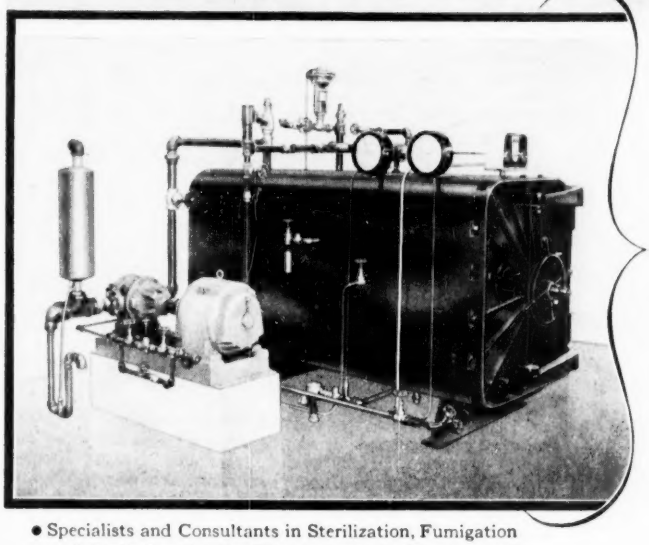
Circle 208R on Reader Service Card

Filtering Material

Filtering material and accessories are described in illustrated brochure. 22 pages.—*Lovell Chemical Co., Watertown 72, Mass.*

Circle 208S on Reader Service Card

American VACUUM-PRESSURE CHAMBERS for



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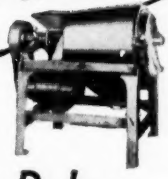

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- Effective control over quality of product

Under peak load production you need a pulper you can depend on. The Indiana E-Z Adjust is it . . . a rugged performer that delivers twice the volume of ordinary pulpers of comparable size—25 to 30 tons per hour with only a 10 hp. motor! The instant control feature—a development of Langsenkamp's modern research—eliminates waste due to raw stock . . . assures a product of maximum quality.

F. H. LANGSENKAMP CO.
227 East South Street Indianapolis 25, Indiana

Extra Flavor Sells Canned Limas!

• Use Huron MSG, the natural wholesome tastebuilder, to bring out the appetizing original flavor of your canned dried-soaked lima beans. It's boosted sales for leading canners. Huron's Technical Service may be able to help you sell more food products, too. Write to the Huron Milling Co., 9 Park Place, New York City 7.

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Frozen Fruit Juices
Fruit Fillings (Pie)
Fruit Juices
Glazes
Ice Cream
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- ☐ Custardizing milk & products containing milk solids
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THEN YOU'LL FIND YOUR ANSWER HERE!

Are your food product and improvement problem listed above? Then follow the lead of top food manufacturers and try SeaKem "Colloids Out of the Sea".* Discover how SeaKem Products can help improve *your* food product . . . make it better . . . easier to sell.

Whether your problem is an old story or "different from anyone else's", chances are SeaKem "Colloids Out of the Sea" and Seaplant Chemical's confidential laboratory service, can mean time and money to you. Fill out and mail coupon today for prompt attention.

*SeaKem is the trade mark for the standardized, water-soluble, sea plant extractives manufactured by the Seaplant Chemical Corporation. Refined by rigidly controlled processes which insure dependable uniformity and purity, SeaKem "Colloids Out of the Sea" are light amber to colorless, free-flowing flaky powders. Available in a variety of types suitable for use in an unusually wide range of food applications (see lists above), SeaKem Products have won acceptance on the basis of proven advantages with leading manufacturers and processors.

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Serving Industry with "Colloids Out of the Sea"

SEAPLANT CHEMICAL CORPORATION
63 David St., New Bedford, Massachusetts

Materials Handling

Conveyor Chain

Leaflet features uses of pitch drop forged conveyor chain. 4 pages.—*Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4.*

Circle 210A on Reader Service Card

Various Trucks

Booklet 53-S illustrates 32 different types of trucks, includes pertinent product data plus how-to-use-it information. 16 pages.—*Nutting Truck and Caster Co., Inc., Faribault, Minn.*

Circle 210B on Reader Service Card

Pallet Rollers

Pallet rollers are described and illustrated in Bulletin 106.—*Frank L. Robinson Co., Latham Sq. Bldg., Oakland 12, Calif.*

Circle 210C on Reader Service Card

Conveyor Idlers

Types of belt conveyor idlers are pictured and described with schematic drawings and dimensional data included for each type in Book 2416. 48 pages.—*Link-Belt Co., 307 N. Michigan Ave., Chicago 1.*

Circle 210D on Reader Service Card

Handling Problems

Catalog 2 presents 12 handling problems and solutions in description and photos. 16 pages.—*Lewis-Shepard Products Inc., 1076 Walnut St., Watertown, Mass.*

Circle 210E on Reader Service Card

Milk Truck

Colored folder 1047-B features bulk milk pick-up truck. 4 pages.—*Stainless & Steel Products Co., 1000 Berry Ave., St. Paul 14, Minn.*

Circle 210F on Reader Service Card

Hydraulic Tailgate

Elevating truck tailgate is pictured in various stages of operation in Bulletin BH-53105. 4 pages.—*The Heil Co., Milwaukee 1.*

Circle 210G on Reader Service Card

Handling Products

All-steel ramps and pallet loaders are illustrated and described in 2-color brochure. 6 pages.—*Elizabeth Iron Works, Inc., P.O. Box 360, Elizabeth B, N. J.*

Circle 210H on Reader Service Card

Plant Supplies

Jet Cleaners

Low cost and heavy duty are claimed for hydraulic jet cleaner in Bulletin 424. 8 pages.—*Sellers Injector Corp., 1600 Hamilton St., Philadelphia 30.*

Circle 210I on Reader Service Card

Industrial Tape

Applications of industrial tape are listed in pamphlet. 8 pages.—*Polyken Industrial Tape, 222 W. Adams St., Chicago 6.*

Circle 210J on Reader Service Card

Pest Control

Booklet describes rodent and insect control in food plants and warehouses. 15 pages.—*Michigan Chemical Corp., St. Louis, Mich.*

Circle 210K on Reader Service Card

Sanitation Products

Industrial sanitary applications are discussed thoroughly in booklet. 48 pages.—*Huntington Laboratories, Inc., Huntington, Ind.*

Circle 210L on Reader Service Card

Mono-Diglycerides

Use of emulsol mono-diglycerides in ice cream production is covered in Bulletin 37. 4 pages.—*Emulsol Corp., 59 E. Madison*

Circle 210M on Reader Service Card

Wooden Containers

Useful booklet contains data on nailed-wood boxes, including illustrations of styles and patterns. 4 pages.—*American Box Co., 1900 W. 3rd St., Cleveland, 13.*

Circle 210N on Reader Service Card

Plastic Pellets

Illustrated booklet explains characteristics and uses of plastic pellets in asphalt-rock mixture for industrial flooring. 8 pages.—*Flash-Stone Co., Inc., 3723 Pulaski Ave., Philadelphia 40.*

Circle 210O on Reader Service Card

Automatic Lubricator

Adaptable automatic lubricator's operation and application are explained in Bulletin NB-11. 4 pages.—*Bijur Lubricating Corp., Rochelle Park, N. J.*

Circle 210P on Reader Service Card

Industrial Wire Cloth

Bulletin 106 covers use of wire cloth for filtration, sizing, cleaning, straining, catalysis, dewatering or screening. 4 pages.—*Cambridge Wire Cloth Co., Cambridge, Md.*

Circle 210Q on Reader Service Card

Flavor Extracts

Comprehensive lists and descriptions of oils, aromatic chemicals and certified colors are given in catalog. 20 pages.—*Dodge & Olcott, Inc., 180 Varick St., New York 14.*

Circle 210R on Reader Service Card

Welding Hose

Pamphlet contains information on types of welding hose with cross section and cutaway photos as well as construction and performance data.—*Quaker Rubber Corp., Tacony and Comly Sts., Philadelphia 24.*

Circle 210S on Reader Service Card

Pipeline Conversion

Converting standard pipelines to "cleaning-in-place" lines is subject of brochure. 6 pages.—*Tri-Clover Machine Co., Kenosha, Wis.*

Circle 211A on Reader Service Card

Safety Latch

Various types of safety latches and hinges are described in illustrated brochure. 6 pages.—*Kason Hardware Corp., 71 Wallabout St., Brooklyn 11.*

Circle 211B on Reader Service Card

Safety Equipment

Industrial safety equipment from safety goggles to respirators is listed in leaflet. 4 pages.—*Pulmosan Safety Equipment Corp., 644 Pacific St., Brooklyn 17.*

Circle 211C on Reader Service Card

Anti-rust Paints

Bulletin L-7257 announces addition of three new colors to anti-rust paint line.—*Paint Corporation of America, Fidelity Bldg., Cleveland 14.*

Circle 211D on Reader Service Card

Floor Resurfacing

Colorful brochure presents details on low-cost cold-applied asphalt resurfacing. 4 pages.—*United Laboratories, Inc., 16801 Euclid Ave., Cleveland 12.*

Circle 211E on Reader Service Card

Steel Shelving

Catalog lists and illustrates many sizes and types of steel shelving. 32 pages.—*Precision Equipment Co., 3710 N. Milwaukee Ave., Chicago 41.*

Circle 211F on Reader Service Card

Pipe Insulation

One-piece, molded fine glass fiber pipe insulation is subject of pamphlet. 6 pages.—*Gustin-Bacon Mfg. Co., Kansas City, Mo.*

Circle 211G on Reader Service Card

Bag Handles

Brochure describes handles for sealing paper bags of all types and sizes, available in several colors.—*Carry-Pack Co., Ltd., 925-941 Wrightwood Ave., Chicago 14.*

Circle 211H on Reader Service Card

Vitamin Products

Seven bulletins concern high stability of vitamin A and D products.—*Technical Service Bureau, Agricultural Dept., Nopco Chemical Co., Enfield & Taylor Streets, Harrison, N. J.*

Circle 211I on Reader Service Card

Miscellaneous

Graphic Panels

Function of central control graphic panels is discussed in illustrated brochure. 4 pages.—*Panellit, Inc., 6312 N. Broadway, Chicago 40.*

Circle 211J on Reader Service Card

Product Appearance

Bulletin gives details on research, instrumentation and technical service on optical appearance of manufactured products and raw materials. 12 pages.—*Hunter Associates Lab., 5421 Brier Rd., Falls Church, Va.*

Circle 211K on Reader Service Card

Engineering Service

Pamphlet describes specialized engineering service for making plant operations automatic. 8 pages.—*CDCS Control Services, Inc., 400 S. Warminster Rd., Hatboro, Pa.*

Circle 211L on Reader Service Card

Conversion Charts

Copies of new conversion charts for use with electric moisture meter show USDA revisions.—*Seedburo Equipment Co., 618-626 W. Jackson Blvd., Chicago 6.*

Circle 211M on Reader Service Card

Proportioning System

Recently developed proportioning and materials handling system is pictured and described in Bulletin 0351. 6 pages.—*Richardson Scale Co., Van Houten Ave., Clifton, N. J.*

Circle 211N on Reader Service Card

pH Meters

Brochure on pH meters includes performance features and photos of four meters in this series. 4 pages.—*Beckman Instruments, Inc., S. Pasadena 1, Calif.*

Circle 211O on Reader Service Card

Adhesive Products

Reference manual deals with adhesives, sealer and surface coatings for use with insulating materials. 18 pages.—*Benjamin Foster Co., 4639 W. Girard Ave., Philadelphia 31.*

Circle 211P on Reader Service Card

Barrel Logistics

Illustrated booklet offers cost-cutting methods for handling of barrels and barrel shapes by power industrial trucks. 8 pages.—*Ewell-Farker Electric Co., 4205 St. Clair Ave., Cleveland 3, O.*

Circle 211Q on Reader Service Card

Steel Drums

Brochure shows methods of fabricating steel drums and describes advantages in use. 4 pages.—*Rheem Mfg. Co., 570 Lexington Ave., New York 22.*

Circle 211R on Reader Service Card

Adding Machines

Speed and accuracy of ten-key adding machines are explained in leaflet. 4 pages.—*Remington Rand Inc., 315 Fourth Ave., New York 10.*

Circle 211S on Reader Service Card

Flow Charts

Charts present relationship between pressure drop, valve size and flow rate in process applications. 4 pages.—*Atkomatic Valve Co., 545 W. Abbot St., Indianapolis, Ind.*

Circle 211T on Reader Service Card

Laboratory Services

Detailed information on laboratory services offered on food-grade antioxidants and industrial chemicals is contained in illustrated brochure. 20 pages.—*Eastman Chemical Products, Inc., Kingsport, Tenn.*

Circle 211U on Reader Service Card

Plant Layout

Bulletin tells about low-cost plant layout system involving use of photocopy. 4 pages.—*Peerless Photo Products, Inc., Shoreham, L. I.*

Circle 211V on Reader Service Card

Production Standards

Booklet defines standards of production, emphasizing economic importance of standardization and includes section on Federal Government policy toward industrial standards. 24 pages.—*American Standards Assn., 70 E. 45th St., New York 17.*

Circle 211W on Reader Service Card

Corn Research

Facts and figures about corn are given comprehensive treatment in 48-page reference booklet, supplemented by colorful wall-size chart and leaflet describing corn refining process.—*Corn Industries Research Foundation, 3 E. 45th St., New York 17.*

Circle 211X on Reader Service Card

Cheese Manufacture

Pamphlet describes process for removal of bacteria after formation of cheese.—*Paul-Lewis Labs., Inc., 1253 N. Port Washington Rd., Milwaukee 12.*

Circle 211Y on Reader Service Card

Building Codes

Booklet contains recommendations and information on building code requirements for vermiculite plastering, acoustical plastic, fireproofing and concrete. 16 pages.—*Vermiculite Institute, 208 S. LaSalle St., Chicago 4.*

Circle 211Z on Reader Service Card

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Any of these very-latest catalogs, bulletins, or folders will be sped to you gratis. Just note here the specific literature you want, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—page 159. Then sign at the bottom and mail.

For your convenience, too, all items in this department are listed and keyed in the Reader Service Section.

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. . . in your brand of canned gravies or meats—then watch sales soar! It's easy, with natural, wholesome Huron MSG. Write Huron's Technical Service about your particular flavor problem. The Huron Milling Co., 9 Park Place, New York City 7.

HURON MSG

PURE MONOSODIUM GLUTAMATE 99+%

Made by the pioneers in protein derivatives

SARCO electric temperature control

ACCURACY AND SENSITIVITY BY SIMPLE ELECTRICAL MEANS

"Very successful in our operation, and I specify them on all our new equipment," says Thomas Allison, Plant Engineer of Southern Gravure Service, Louisville, Ky. ***(See photo at left)***

IN HIS CASE the operation is plating, an industry in which SARCO electric controls have found wide adoption.

There are many others: For example, dryers in the textile, tanning, food and chemical industries; dyeing and wet finishing processes in textiles; processing, distilling and evaporating in chemical plants.

SARCO'S complete line includes also thermostats and solenoid or motor valves for space heating, air conditioning and refrigeration control.

Get the whole story by writing for bulletins 1025 and 1080.

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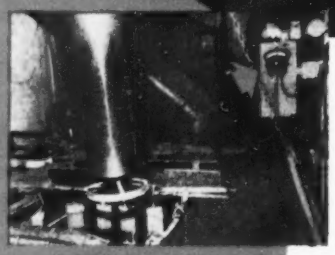
EMPIRE STATE BUILDING, NEW YORK 1, N. Y.
SARCO CANADA LTD., TORONTO 8, ONTARIO
REPRESENTED IN PRINCIPAL CITIES

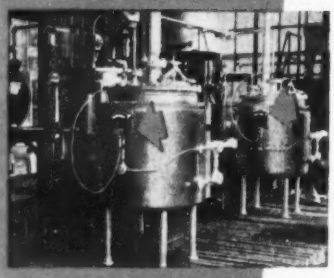
PLATING

In copper and chromium plating of rotogravure rolls, the temperature of plating solutions is held to within ½°F by Sarco Electric Indicating Temperature Controllers. Photo taken in Southern Gravure Service plant, Louisville, Ky.



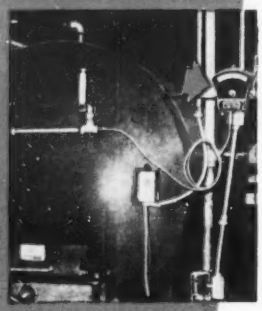
CHEMICAL

Hoffman La Roche Pharmaceutical Co., Nutley, N. J.—the jacket water temperature of these stills must be held to within ½°F. For the past 9 years, Sarco LSI Indicating Temperature Controllers have been doing that job.



FOOD

Chocolate milk and soft drinks in bottles and cans are processed in Fort Wayne Sterilizers. Many users equip these Sterilizers with Sarco LSI Electric Indicating Controllers to hold the temperature to within ½°F. Hook-up sketches and case histories on request.



TEXTILE

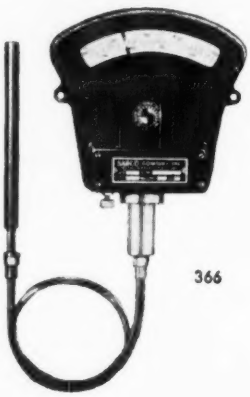
The Backus Hosiery Conditioner processes 15 denier nylon hosiery—40 dozen per 1 hour cycle. The humidity and dry heat are controlled by two Sarco Electric Indicating Temperature Controllers. Over 500 LSI's have been factory-installed on these Conditioners by Backus Machine Works, Carlstadt, N. J.

TYPE LSI

An extremely sensitive and accurate Electric Indicating Temperature Controller for temperatures from minus 90°F to plus 650°F. Controls electric heating elements, motors, solenoid or motor valves to maintain constant temperature.

A built-in thermometer makes setting easy and provides a continuous check on temperatures maintained without the bother of continually changing charts.

A double switch type L2SI is available for alternate heating and cooling control, or step control of heating or cooling.



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3 WAREHOUSE LOCATIONS
Proper Temperature for Frozen Foods

New Advertisements

received by November 20th will appear in the December issue subject to limitation of space available. Address copy to the

FOOD ENGINEERING
330 W. 42nd St., New York 36, N. Y.

Ingredients
For the Food Processor

CARROT OIL makes foods golden yellow

Carrot oil, like butter, contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A.
Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil and because it contributes vitamin A of high stability and desirable golden yellow color. Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

SEND FOR BOOKLET
New 36 page combined catalog on carrot oil for foods, feeds, and pharmaceuticals. Important reading for most food processors. Write today!

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205 Broad St., South Whiteley, Ind.

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Send NEW ADVERTISEMENTS to New York City Office, 330 W. 42nd St., New York 36, N. Y., for the December issue closing November 20th

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
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POSITIONS VACANT

CHEMICAL ENGINEER required, bilingual with large experience in food canning, specially meat canning. Work will entail Management of Montreal Plant production of present manufactured goods and of future products. Salary will depend on experience and qualifications. All replies will be held confidential. P-9417, Food Engineering.

PRODUCTION SUPERVISOR wanted—Must have experience in production of Baker's Specialties, Jams, Flour Mixes, Flavors, etc. Excellent opportunity with large, well established firm. Give all details training and experience, in confidence. P-9366, Food Engineering.

COOK ROOM Supervisor for large Eastern Food Processing Plant. Must be thoroughly experienced in operation of pressure retorts for variety of vegetables and dry pack items. Also be able to train operators. State experience and salary desired. P-9560, Food Engineering.

SANITARIAN, MUST be familiar with up-to-date food plant sanitation methods, supervise and train personnel for large eastern canner. State experience and salary. P-9558, Food Engineering.

PRODUCTION MANAGER to take charge of operations for canning concern packing large line of products. Wide technical and engineering experience necessary. Give full details and qualifications. Location Eastern Seaboard. P-9559, Food Engineering.

FOOD RESEARCH Administrator. Leading institution is seeking a food scientist to head group engaged in long-range investigations of basic problems involving new methods, processes and products. Demonstrated research and executive ability necessary; specialized knowledge of nutrition desirable. Prefer man in forties. Social life in organization and professional opportunities are excellent. P-9577, Food Engineering.

MASTER MAINTENANCE Mechanic desired by a leading fruit processing association in the Mid-Columbia Area of Oregon to take complete charge of cannery maintenance, repair, and mechanical construction work. It is desirable that the applicant have supervisory experience in maintenance and repair of cannery processing equipment. He must have some knowledge of machine design, materials, layout, and cost estimating. Permanent position with advancement in authority and salary for the man with the desired ability. Salary open. Give full qualifications and references first letter. P-9448, Food Engineering.

EMPLOYMENT SERVICE

SALARIED PERSONNEL $3,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. F, 241 Orange St., New Haven, Conn.

WE NEED!
FOOD TECHNOLOGISTS and FOOD CANNING CANDIDATES
—Juniors to top-level.
Call, write or wire:
Gladys Hunting (Consultant)
Drake Personnel, Inc.
7 W. Madison St. Chicago 2, Ill.

POSITIONS WANTED

FOOD TECHNOLOGIST, B.S., Age 30, Family. Three years combined experience in laboratory, technical service, and sales in the corn refining industry. Willing to travel to some extent if necessary. Presently employed. Prefer northeast, but will consider other locations. PW-9429, Food Engineering.

WANTED: A position with opportunity, not a job. Food Technologist with over 15 years production, research and development of various foods desires challenging and responsible position. Major products are beverage bases, condiments, canned foods, vitamins, flavorings, soup bases. Specialist in soluble coffee production and development. Respected and well-liked by subordinates, associates and superiors. PW-9470, Food Engineering.

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FOOD TECHNOLOGIST graduate 1950, experience in Quality Control and production of frozen concentrates, jellies and preserves. Desires a position of responsibility in production or Quality Control. PW-9671, Food Engineering.

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PUMP LINE wanted by established Manufacturers Representative in New York City. Qualified pump engineers with excellent contacts Chemical Petroleum Food Industrial Manufacturing and contrasting fields. RA-9553, Food Engineering.

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Complete with refrigeration equipment for low temperature fast freezing, plus 920 sq. ft. low temperature room. Entire building 8,000 sq. ft., brick, 1 story, high ceiling, offices, plus 5,000 sq. ft. of land.
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AUGER TYPE POWDER FILLER
up to 3 lb capacity. Send details on condition and price.
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Koven 2500 gal. Steam Jacketed Spiral Paste Mixer.
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B.P. type 3500 gal. Steam Jacketed Double Arm Mixer.
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Charlotte S/S Colloid Mill, Model A15, 15 HP

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4—Buflovak Vacuum Shelf Dryers, 20 shelves each.
1—Baker Perkins Stainless Steel Sigma Blade Jacketed Mixer, 9 gals.
1—Acme Stainless Steel Vertical Storage Tank, 12,000 gals. With coils.
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1—Stainless Steel Crystallizing Tank, 6,000 gals.

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Of Food Engineering published monthly at Albany, New York for October 1, 1953.

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PHILADELPHIA 3 ... Edward A. Martin
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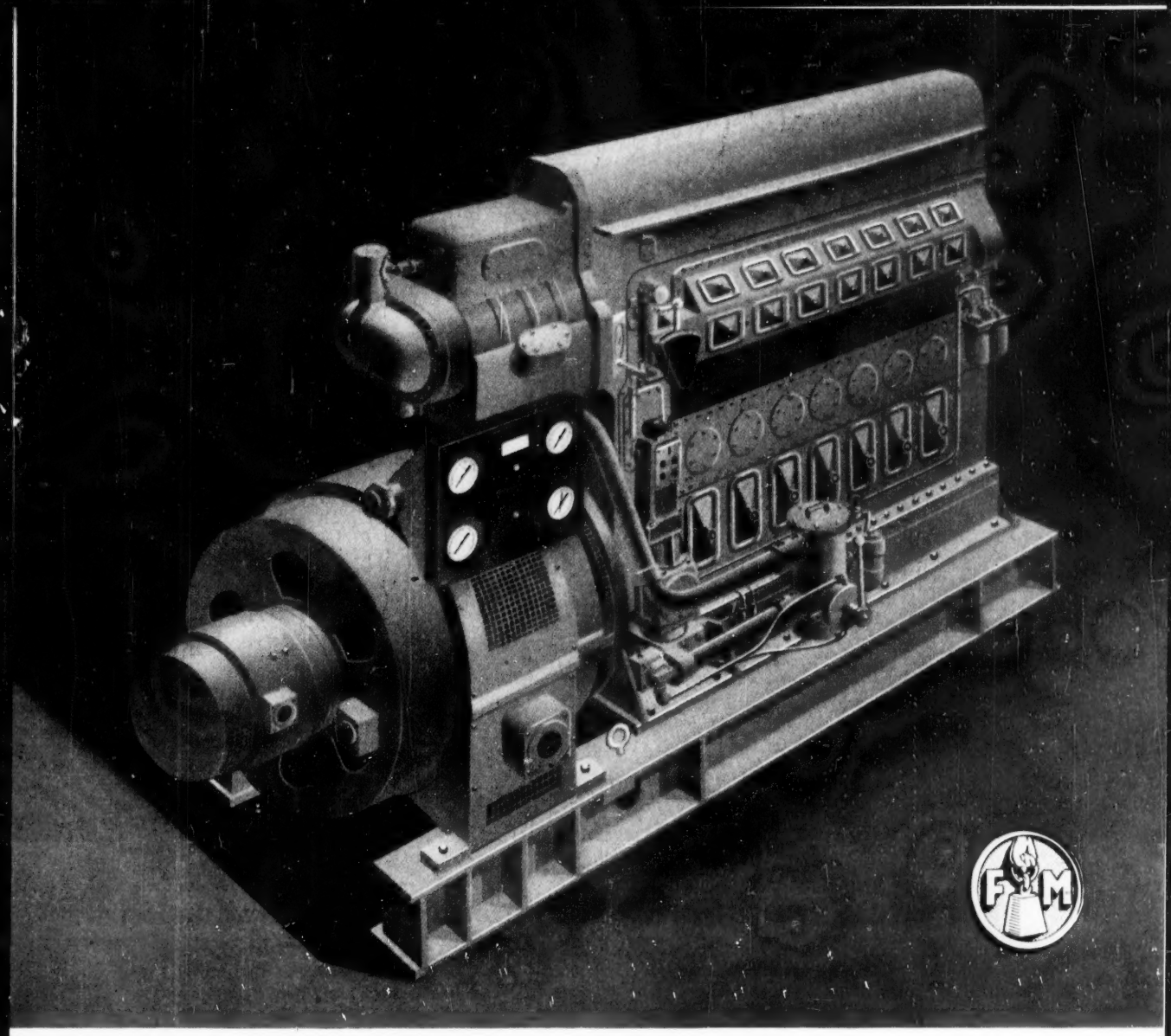
SAN FRANCISCO 4 ... J. W. Otterson
68 Post St., Douglass 22-4600

ST. LOUIS 8 ... J. G. Cashin
Continental Bldg., Lucas 4867

LONDON, ENGLAND ... W. J. Tydeman
95 Farrington Street, E. C. 4



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You'll find a sponge made with Myvatex Food Emulsifier is firm and silky in texture—it is easier to work, leaves the mixing machine clean and fast.

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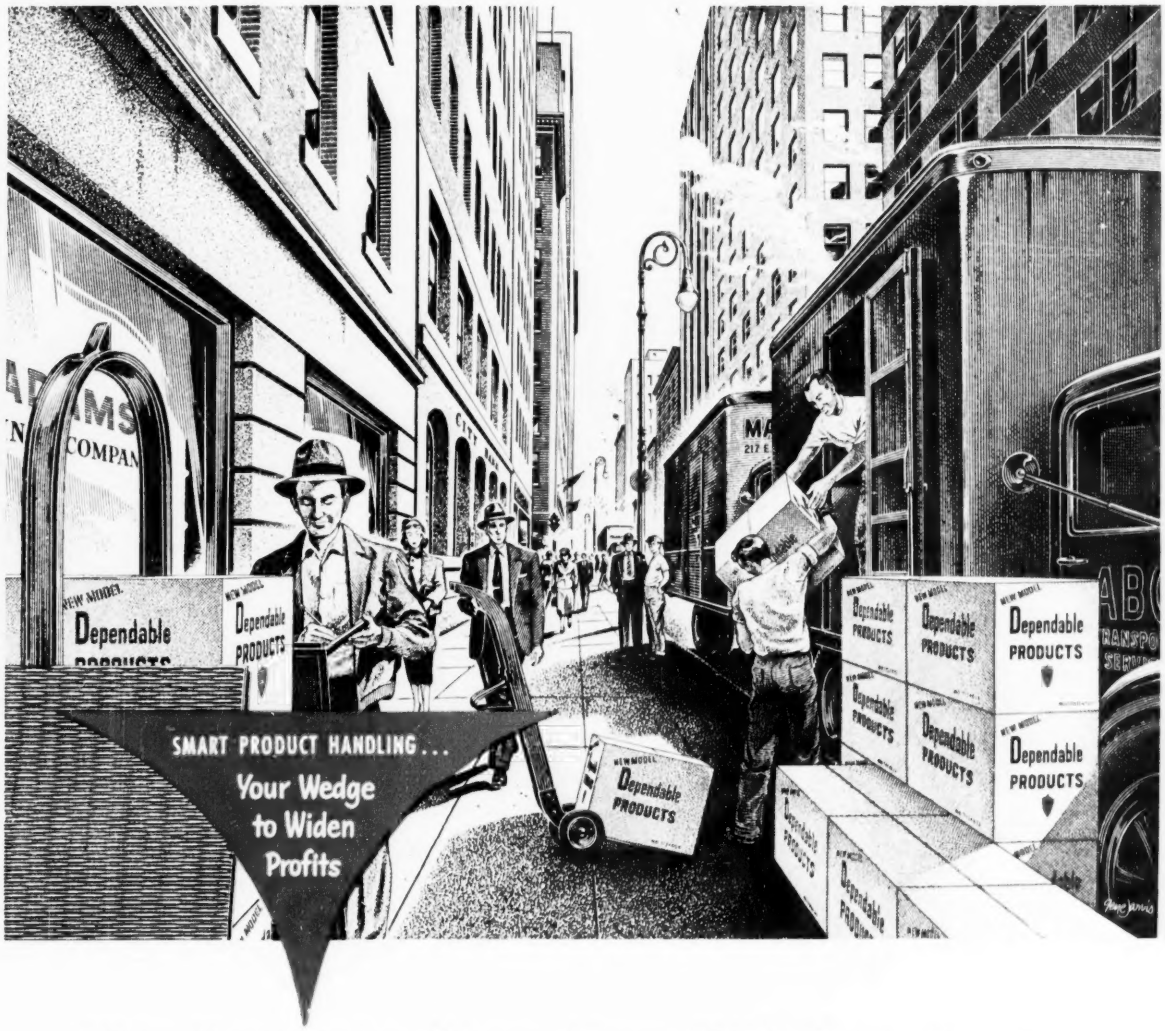

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A revolutionary new principle in Coolers . . .

THE holo-flite* PROCESSOR

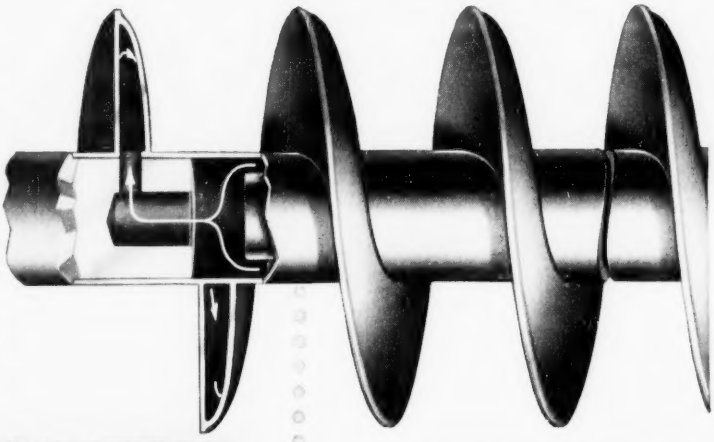
(HOLLOW-FLITE)

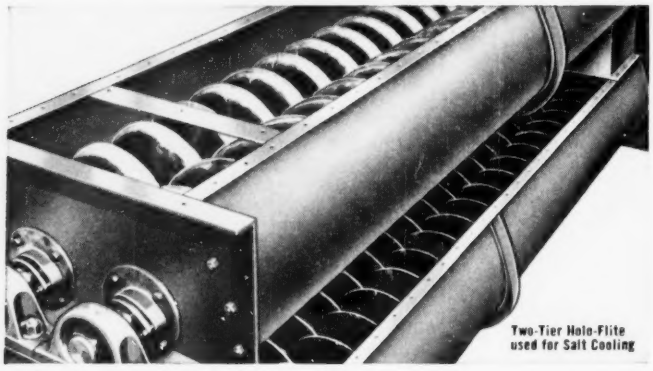
▶ **Handles Pastes, Sludges or Solids!**

▶ **Up to 80% Saving in Space!**

▶ **Permits Continuous, High Efficiency Operation!**

Backed by the same well-known organization that pioneered COTTRELL Precipitators, MULTICLONE Collectors and other leading products, the HOLO-FLITE Processor represents a far-reaching advancement in the science of heat-exchanger design. Widely adaptable to various types of cooling and similar applications in industrial processing operations, the HOLO-FLITE handles powdered or granular solids, moist pastes or slurries with equal facility. Moreover, it requires as little as 1/5th the space of other heat exchangers . . . causes no dust, therefore requires no costly or complicated auxiliary recovery equipment . . . and maintains its uniformly high efficiency under modern continuous-flow operations (no stop-and-go "batching" operations are necessary).





Two-Tier Holo-Flite used for Salt Cooling

Unique Simplicity

Basically, the HOLO-FLITE consists of two or more hollow intermeshing conveyor screws that slowly rotate in a trough or tube. The cooling agent circulates through the hollow flights and shafts of the conveyor screws while the product itself "flows" in the trough where it is constantly rotated into, around, over and under the moving heat-exchange surfaces. The continuous mixing, turning, folding action causes a constant change of contact with the heat-exchange surfaces and results in a high rate of heat transfer. Yet the action is so gentle that there is no dusting and little, if any, abrasion of crystalline particles.

Unlimited Capacity

HOLO-FLITE Processors can be readily adapted to virtually any capacity requirement and are in daily operation on such varied products as sand, cement, cottonseed cake, soybean meal, borax, salt, sugar, baby foods, and many other products. Cooled products can be packaged directly from the HOLO-FLITE discharge, saving time, space and additional handling.

Be sure to investigate HOLO-FLITE savings before you install heat-exchange equipment. To insure maximum operating efficiency at low overall cost, each installation is individually engineered to the job using basic stock-size elements. Contact the nearest Western Precipitation office for further details on the revolutionary HOLO-FLITE Processor—or write direct!

FREE! New 8 Page Bulletin describing HOLO-FLITE features and applications will gladly be sent on request!

*Reg. T.M.

A FEW OF MANY HOLO-FLITE ADVANTAGES

WIDE ADAPTABILITY: HOLO-FLITE handles fine-grained, crystalline or powdered solids, pulps, pastes and slurries with equal ease. Heat transfer agent can be refrigerant, cooled or ambient water, or other fluids to provide a wide range of processing temperatures.

SPACE-SAVING COMPACTNESS: Because of its large active heat-transfer surface per cubic foot of space required, the HOLO-FLITE requires only a minimum of space—is 5 to 6 times as compact as other equipment of comparable capacity!

LOW POWER REQUIREMENTS: HOLO-FLITE conveyor screws rotate slowly—usually only 1 to 12 r.p.m. Further, multiple tiers can be driven by one motor, assuring low power consumption.

INSTALLATION FLEXIBILITY: The basic HOLO-FLITE unit is two intermeshing screws in a single trough, but four or six screws per trough can also be installed. Moreover, any number of troughs can be "tiered" on top of one another—trough lengths can be varied from 8 to 20 ft.—screw diameters can be varied from 7" to 16"—to provide virtually any desired capacity in a minimum of space!

Write for full details on the many savings the HOLO-FLITE *Processor can bring to your particular applications.*

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